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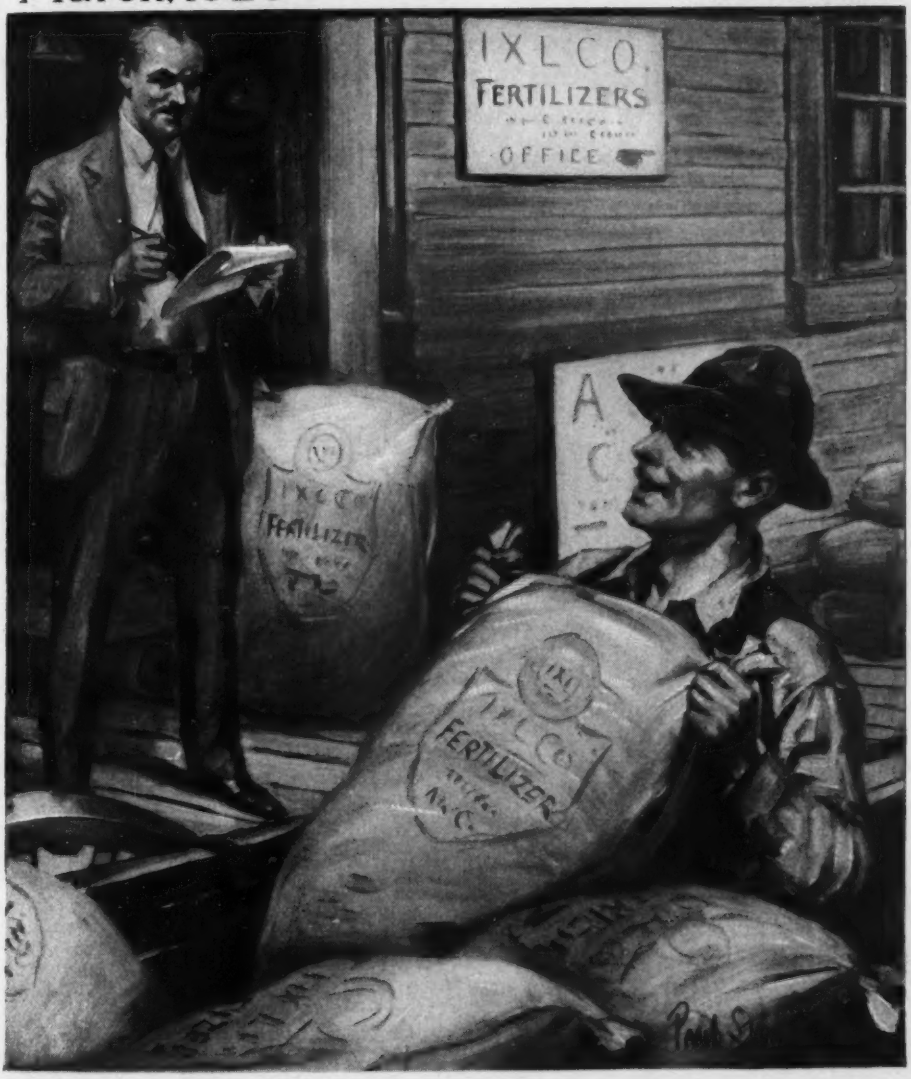


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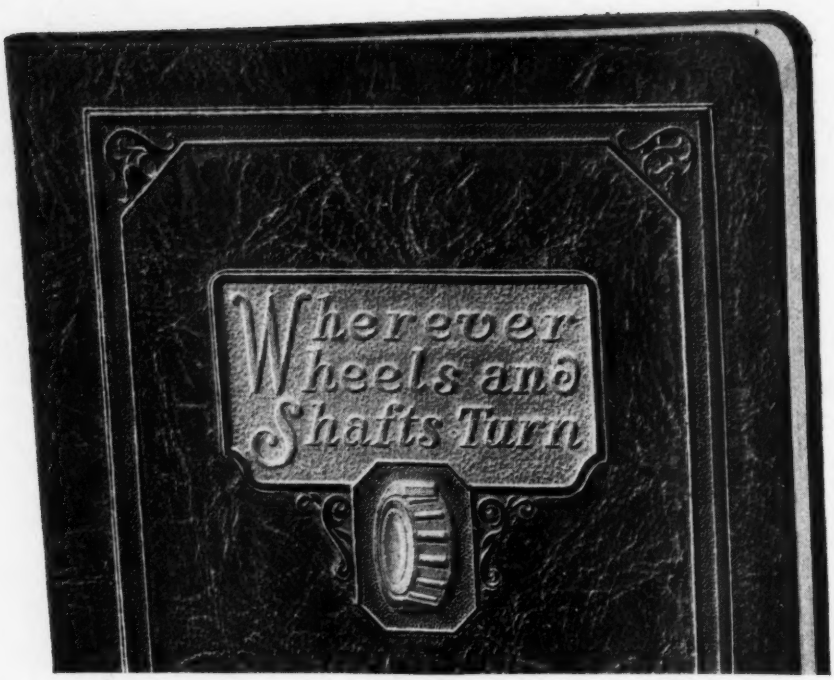


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# Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*
*Editorial Offices:* 19 West 44th Street New York

VOLUME XII NUMBER THREE

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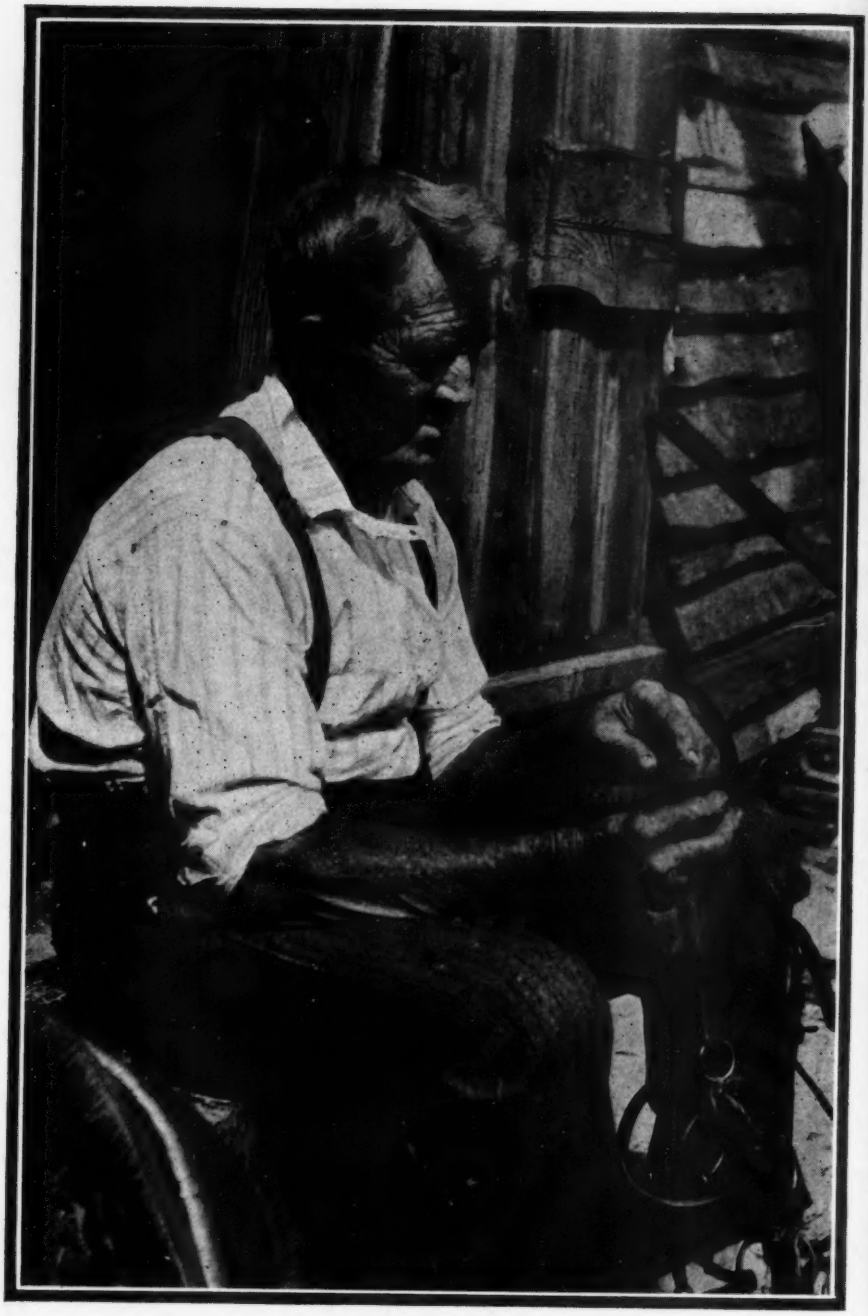

Getting Ready

Better Crops with PLANT FOOD

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VOL. XII NEW YORK, MARCH, 1929 No. 3

Jeff ponders over the meaning of—

# Organization

By Jeff McDermid

IN Mr. Milne's popular juvenile story Pooh Bear was asked by Rabbit to help organize a hunt for something that was lost. As "organdize" was puzzling to Pooh Bear, Rabbit explained it by saying, "It is what you do to a Search when everyone doesn't look in the same place at the same time."

Probably no economic encyclopedia contains a better general definition of organization than the one Rabbit gave Pooh Bear in my youngsters' favorite classic. I have found that they heed the bunny's advice when they rifle my pockets at the evening homecoming. Thus babes are learning the touchstone of efficiency.

"My company is well organized in that territory" is the stock phrase denoting acumen, activity, and alertness in our commercial world. "His faculties and talents are well organized" is said in explanation of a successful bond salesman who had no more brains to begin with than we. "When the sun rises in the west our farmers will be perfectly organized" wisecracks the skeptic whose scheme for rural relief died in the committee room.

Pooh Bear's brain was made of fuzzy woolen rags and he lamented his woeful lack of knowledge and appreciation of organization. You and I know brains made of stouter stuff

wherein no gleam of the glamor pertaining to organization has penetrated.

There was a time when things of importance "just happened," like the weather and the mumps, and folks drifted along with the current of life's stream unharrassed by organizers or efficiency experts. Of course, in those days a number of events occurred like the Magna Carta and the discovery of America, wholly without the aid of sublimated steering committees or business executives as we know them today. When such "accidents" occur today there is always somebody or some group of somebodies willing to admit that it was a carefully planned procedure brought about by systematic surveys, campaigns, and conferences.

We know now why Moses didn't reach the Promised Land, although the testament tries to hush it up. The truth has leaked out. Like a good many other Methodist preachers since, he was a great exhorter and a fanatic for fresh water, but he simply didnt' have his own organization with him one hundred per!

WHILE we are tracing the organization spirit, we might as well start with the original organizer. Referring back of Moses' time in the sixth chapter of Genesis, notice that a man named Noah built a barge of gopher wood and covered it with pitch. Then, with Shem, Ham, and Japhet as efficiency experts, he tried his best to form a bone-dry association. Only a few human beings had sense enough to join, but he signed up the entire zoological kingdom in less than one week. After the flood subsided Noah forgot the pledge and drank efficiently of julep juice, merely to commemorate a return to normalcy. His sons thought it was a poor way for a national hero to behave, but they should have made allowance for the fact that he was six hundred years old. Perhaps when we reach that age we shall also possess his capacity for organization and the same enjoyment of it afterwards.

Tradition made the first great trade-marks, for there was no organization or advertising as we know them in all their glory. Men and their materials earned famous reputations through a queer monopoly of a kind not known today. This may seem odd until you look back a bit.

There was Damascus steel, Newcastle coal, Parisian gowns, Turkish harems, Norwegian sardines, French mushrooms, and Arabian horses. There stood Roman noses, German sauerkraut, Swiss watches and Swiss yodels, English plum pudding, Spanish shawls, Nuremberg toys, Jewish money, and Scotch thrift.

CUSTOM and precedent, with little or no active competition, led our ancestors to think in bromide terms like those. The era of a Carnegie to wrest the glory from Damascus blades or a Flo Ziegfeld to show us that feminine pulchritude could flourish outside of Turkey came to us when mankind first became vicariously organized. Since then we Americans have produced and profitably purveyed sardines made out of carp, sauerkraut from Wisconsin cabbage, watches from Elgin and elsewhere, and silk gowns from wood pulp!

It would take a research artist to unravel the skein of organization which has become the warp and woof of the loom of life.

The first vague outlines appear in the annals of tribal rites and ceremonies. In the nomadic reign of terror and savagery men presumably "lost their heads" over the matter even as some do now. We have some traces of it left in the Pueblo snake dance and the drum ceremony of the Ojibwas.

Its next stronghold was in the mili-

(*Turn to Page 59*)

Note how the cattle have reached through the fence to get pasture fertilized with 500 lbs. of 0-16-20 and 2,500 lbs. of limestone, while in back of the man where no fertilizer was applied, the cattle did not reach through the fence.

# Better Pastures

*By G. L. Schuster*

Agronomist, Delaware Agricultural Experiment Station

ACCORDING to the 1925 agricultural census there are 53,250,000 acres of farm land in the New England and Middle Atlantic states. Thirty-eight per cent of this land is in pasture and 44 per cent is in other crop land. The balance is land not actually under cultivation or used as pasture. In this same territory there are about 6,500,000 animal units or about one animal unit to three acres of pasture.

The animal products such as all dairy, sheep, and goat products amount to $3,000,000. The total livestock value is nearly $449,000,000 exclusive of products.

The value of all crops for the section is given as nearly $517,000,000. These figures are important because they show that the New England and Middle Atlantic section as a whole has a large livestock and pasture project.

Pasture land is important. What is being done to conserve and improve the pastures? At the winter meeting of the New England Agronomists in New York about 100 agronomists and others interested in agriculture gathered together to discuss the improvement of pastures.

White of Pennsylvania has made a study of the feed units (digestible nutrients) produced in a pasture vs. a grain rotation on DeKalb, Volusia, and Westmoreland soils with various treatments. As a general average the pasture produced 10.9 per cent greater weight of air dry matter, 7.4 per cent more digestible nutrients, and 189 per cent more digestible crude protein than the grain rotation. Potash produced an increase of 29 per cent in feed units in the pasture and 43 per

cent increase in the grain rotation. Nitrogen increased the nutrients 37 per cent in the pasture and 6 per cent in the rotation. The NPK treatment increased the nutrients in the pasture 9 per cent over that of reinforced manure but the manure treatment was 9 per cent more effective than the NPK in the grain rotation. The average computed acre values of pasture resulting from the various treatments are: no treatment $3.57; CaP $25.20; CaPK $32.31; CaNPK $40.92; and CaMP $35.84.

Misner states that the cost of pasturing an animal unit in New York State is from $4.00 to $8.00 per season and that the cost of maintaining pasture land is about 8.3 per cent of its value. The net value per acre of pasture in terms of milk production was $11.37 per acre. The average crop return for the period 1923-27 was $1.00 per acre or a return of about 40c per hour for time when all costs including labor were excluded.

Sprague made a pasture survey in New Jersey during 1926-27 of 264 pastures in representative sections of the state. Using the feed units produced as a measure, he found that the Coastal Plain soils supported the best pastures; the Glacial Lake and River Terrace soils were nearly as valuable and that Glacial soils were the least productive. The abundance of Kentucky bluegrass and white clover was correlated with productivity. The average yield per acre per year was 1,065 feed units or the equivalent of 2,330 lbs. of alfalfa hay. The 48 better pastures averaged 2,823 feed units. Lime, manure, and commercial fertilizers were used more on the best pastures than on the pastures generally.

Haskell took some typical rock-bound, weed-grown permanent pasture in Massachusetts that probably had not been plowed for more than 100 years and fertilized it in 1921 and again in 1922. In June of 1923 the animals were taken off for a three-week period and the three-week growth was harvested and analyzed. The fertilizer treatments and results are given below.

Haskell says, "The greatly increased yield of protein on the best treated plot is most significant, with a total production equal to that contained in 2,400 lbs. of wheat bran. The cause of this is of course the stimulation of clover and the suppression of the weeds brought about by the use of lime and fertilizer." Haskell concludes that while it is impracticable to translate the above figures into terms of profit and loss because we have no means of knowing how long a time fertilizer will continue to show benefit, yet a pasture which is in a weedy or run-down condition because of a lack of plant food can be brought back to a productive condition only by the use of plant food.

Cooper and others have pointed out the importance of climate and soil in regulating pasture flora. Kentucky

| Fertilizer treatment | Dry matter per A. lbs. | Protein per A. lbs. |
|---|---|---|
| Superphosphate 960 lbs.; no lime | 863 | 122 |
| Superphosphate 960 lbs.; limestone 2,400 lbs. | 1,050 | 196 |
| Muriate of potash 160 lbs.; no lime | 676 | 140 |
| Muriate of potash 160 lbs.; limestone 2,400 lbs. | 1,023 | 238 |
| No fertilizer; no lime | 703 | 103 |
| Limestone 2,400 lbs. | 766 | 138 |
| P 960 lbs.; K 160 lbs.; no lime | 1,272 | 262 |
| P 960 lbs.; K 160 lbs.; limestone 2,400 lbs. | 1,576 | 387 |

bluegrass is the most widely distributed dominant pasture plant in the northeastern states. It is soft and palatable and grows best on soils which are well supplied with potassium, calcium, and phosphorus.

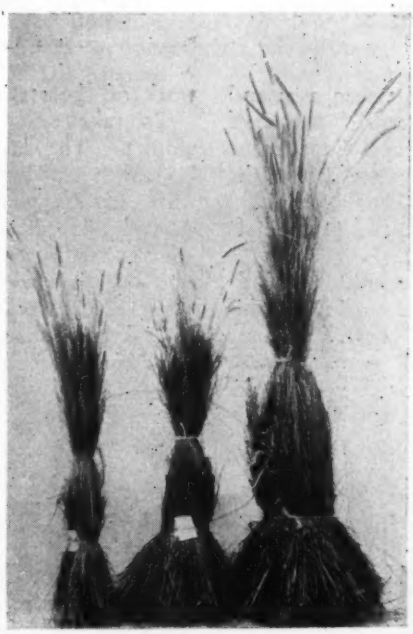
Such plants as Kentucky bluegrass and white clover seem to prefer nitrate nitrogen or a complex favorable for the production of nitrates and are apt to dominate on soils which are well supplied with calcium, potassium, phosphorus, or other materials of a similar nature. Such plants as red fescue, redtop, and Rhode Island bentgrass may utilize ammonia nitrogen to advantage and thus dominate acid soils. These soils probably contain large amounts of magnesium, aluminum, manganese, and silicon.

The amount of available material in a given soil for plant food may greatly influence the mineral content of the crop. The food value of a crop grown on a soil well supplied with such materials as calcium, potassium, and phosphorus, may be superior to a crop supplied with those materials commonly present in acid soils. Crops like alfalfa, clover, timothy, and bluegrass grown on limestone soil would be expected to have a higher feeding value than when grown on less productive acid soils. Such plants as alfalfa, clover, and bluegrass belong to the group that absorbs large amounts of potassium, calcium, etc.

Maynard points out that the failure of the grazing industry in certain areas has been due to a deficiency of the herbage in certain essential elements which results in a type of malnutrition and disease where animals obtain all their food from pasture. Many experiments have shown that certain mineral deficiencies in pasture grass can be made good by fertilization and that the troubles occurring in grazing animals as a result of these deficiencies can thus be prevented or cured. This deficiency may be overcome by feeding a mineral supplement but it would seem to be more desirable from a nutritional and livestock management standpoint to pasture grasses sufficiently rich in the essential elements so as to require no supplement. In some cases, however, it would no doubt be impracticable to meet such conditions by adding mineral fertilizers to the pasture land.

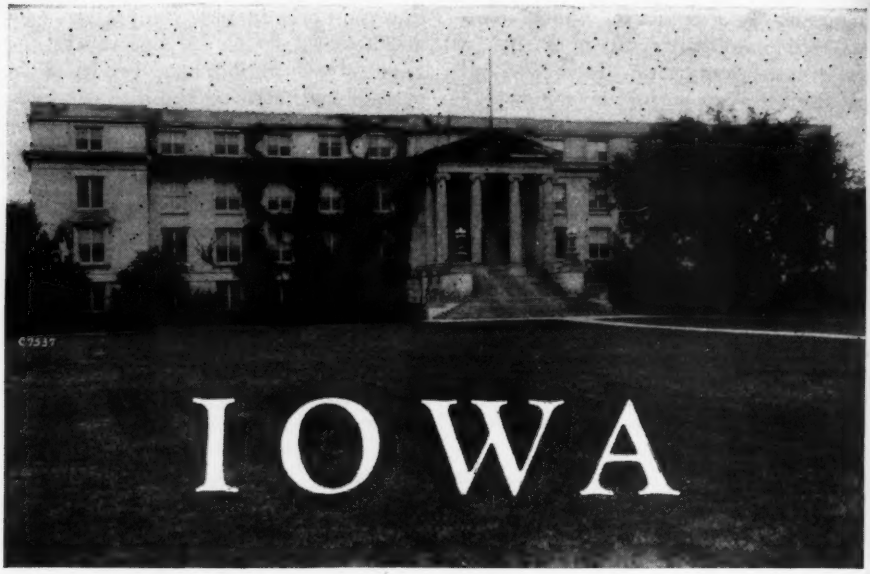
Nitrogen supplies the leafy vegetable growth of plants. It may be looked upon as supplying the factory in which the other elements operate. Therefore nitrogen should be available for pasture production. The soil type and its management will determine largely how much, if any, nitrogen should be added.

Archibald has found that pasture plots fertilized and grazed intensively materially increased in the production of dry matter and the nitrogen, calcium, and phosphorus in the dry matter. Cooper has pointed out that for soft pasture grasses like Kentucky bluegrass and white clover (*Turn to Page 59*)



**What Potash Did.**

**Left: No fertilizer**
**Center, 2,500 lbs. limestone**
**500 lbs. 0-16-0**
**Right, 2,500 lbs. limestone**
**500 lbs. 0-16-20**




¶ *The thirty-fifth of our experiment station stories*

## *By Blair Converse*

Bulletin Editor, Iowa Agricultural Experiment Station

ONE hundred and eleven men and women—members of the staff of the Iowa Agricultural Experiment Station—are working today in the laboratory and in the field on more than 200 specific problems of agriculture.

Although not all of them are full-time employees of the station, this personnel and the number of projects upon which they are at work make a striking contrast to the staff and the experiment station program described in the first station report published in May, 1888.

These 40 years have seen not only a remarkable growth in the work of the station and the support which is given to it, but they have seen as well —and herein lies the reason for the continued support—the contribution to the state and to agriculture generally of ideas which are of inestimable value. The agriculture of Iowa has been enriched by literally scores of millions of dollars through the work of the station.

To take only three or four examples. The last Yearbook of the United States Department of Agriculture estimates that three varieties of oats developed at the Iowa Station were grown in 1924 on at least 6,000,000 acres in the Midwest. These oats averaged at least three bushels to the acre better than old varieties. If these figures are anywhere near accurate—and they are too low, if anything—this one service of the station gave to the farmers who grew the oats an increased income of over $6,000,000 in a single year.

The Iowa system of soil management is the result of many experiments, with many types of soils and crops. Soil surveys have been made of about three-fourths of the counties of the state and reports of these surveys with detailed colored soil maps have been published for 55 counties. Besides the experiments with soils conducted at the agronomy farm

near the campus, about 100 cooperative soils experiment fields have been established on private farms in all parts of the state. These various efforts have furnished a tremendous mass of data concerning Iowa soils and the problems of their management. From these data the station has developed recommendations which are carried to the farmers of the state through the station publications and the extension service.

Another experiment which has run over a number of years and which has been the basis of recommendations which have added much to the income from dairying in the state as well as in other states is the so-called Arkansas experiment, in which the records of the progeny of scrub cows crossed with purebreds have been carefully kept and compared with the production of their dams.

The foundation animals used in this experiment were bought some 15 years ago in an isolated region of Arkansas. They possessed no blood of an improved dairy breed. The progeny of two of the foundation cows have now been carried to the fourth generation. The butterfat production of the two scrubs was 169 and 193 pounds respectively. These cows were bred to purebred bulls, as were their daughters. A daughter of the first, in the third generation, gave a butterfat yield of 439 pounds. The granddaughter of the other scrub gave a yield of 402 pounds.

This experiment has done much to convince farmers of the importance of the purebred sire. Not only were the grades of the first, second, and third generation more abundant producers than their dams, but they were more economical in their use of feed and they returned greater profits over feed costs.

It is interesting to trace, through the 30-some volumes published by the station, the development of the experimental work. Through the years it has undergone a "settling down" and a balancing process. It took some time, apparently, for the investigators to discover the fields of research most vital to Iowa agriculture.

The station work has gradually grown in two directions. In one direction it has become more broad and

C. F. Curtiss, dean of agriculture and director of the Iowa Agricultural Experiment Station

fundamental. For example, the soils section is still working on a basic survey and analysis of the soils of the state; the economic section is developing a basic study of the geography of Iowa agriculture as well as a type of farming study.

In another direction the research work has become more and more refined and specific. As one problem has been solved, the workers have gone on to an even more restricted and specific problem.

It is not difficult to imagine the state of mind of the members of the first station staff back in 1888. With no previous work—at least in Iowa—to build on, with the whole state a virgin field as far as agricultural research went, with practically no equipment with which to work, with only a small piece of unbroken prairie as an experimental field, they had a fascinating and a difficult task.

The first director was R. P. Speer. Under him were four full-time station workers and six members of the college faculty who gave a fraction of their time to station work.

In the first bulletin of the station, published in May, 1888, Director Speer gives a brief summary of the lines of investigation he plans to take up. The station, he says, will conduct work with sugar beets, will endeavor to find and propagate cereal plants and grasses suitable to the Iowa climate, and it will test out drainage, sub-soiling, green manuring and crop rotations. The station botanist and the assistant director are to go on specimen hunting trips into the "new states and territories further west."

"We expect," Director Speer continues, "to be disappointed very often in the results of our experiments, but hope to strike a lead once in a while which will enhance the agricultural interests of the state."

Director Speer's modest hope has been realized, not only by himself and his co-workers of the early days of the station, but by the hundreds who have followed them.

In the spring of 1891 James Wilson, later to become the first secretary of the United States Department of Agriculture, succeeded Mr. Speer as director of the station. C. F. Curtiss, a recent graduate of the college, became Director Wilson's assistant. When Director Wilson went to Washington, Professor Curtiss became director of the experiment station and dean of agriculture, positions which he still holds.

For 32 years the station has had the advantage of the consistent policy and consecutive effort given to it by Director Curtiss. In his early experiments under "Tama Jim" Wilson, Dean Curtiss was primarily concerned with livestock problems. Due to this interest and the outstanding importance

Cattle Feeders' Day at the Station's animal husbandry farm.

of the livestock industry in Iowa, experiments in the feeding, breeding, and management of livestock have always played an important part in the work of the station. It was the Iowa station which developed the self-feeder system of feeding livestock; it was to the fore in the experimentation with mineral mixtures and hogging down corn. Literally hundreds of experiments with all phases of animal husbandry have been conducted. The annual swine and cattle feeders' day at the station, at which the experimental results of the current year are explained, have become important events attended each year by 1,200 to 1,500 farmers. But animal husbandry has not been permitted to overshadow the other work of the station. As it is now organized, the station consists of 15 sections: agricultural engineering, agricultural economics and farm management, farm crops, soils, animal husbandry, dairy husbandry, poultry husbandry, bacteriology, botany and plant pathology, chemistry, dairy industry, entomology, genetics, horticulture and forestry, and vegetable crops.

**W. H. Stevenson, vice-director of the Iowa Agricultural Experiment Station.**

The station now has an annual appropriation of about $350,000, of which $60,000 comes from the federal government. The total includes some $40,000 realized each year from the sale of livestock, crops, and other products.

The station is now well provided with land upon which to conduct its experiments. The college and experiment station domain consists of 1,994 acres, 250 of which are occupied by the campus proper. All of the farms lie within easy distance of the campus. The 200 acre Agronomy Farm is laid out into soil and crops test plots. Recently a $20,000 storage and laboratory building was erected on this farm.

The Animal Husbandry experimental farm of 180 acres is a part of the equipment of the animal husbandry section. The Dairy section has a 280-acre dairy farm. Smaller amounts of land are under the direction of the horticultural and forestry section, poultry husbandry, agricultural engineering, vegetable crops, and other sections. Last year the agricultural engineering section rented a farm near the college, which it is handling as far as possible with mechanical power.

Each year the Iowa Station publishes from 25 to 40 bulletins and circulars. These publications are of four sorts: "regular" bulletins, for general distribution but dealing with original research work; circulars, popular publications, not necessarily dealing with original research; research bulletins; and county soil survey reports.

In 1927 the station distributed 120,000 each of its bulletins and circulars and 25,000 research bulletins.

In the first year of the station an

(*Turn to Page* 53)

# Good Alfalfa Needs Plenty of Potash

*By Ford S. Prince*

Agronomist, New Hampshire Agricultural Experiment Station

POTASH has given the most benefit to alfalfa of any fertilizer element tried out in an experiment conducted by the New Hampshire Experiment Station on an outlying experimental field in Greenland, N. H.

On plots seeded in 1926 and from which two cuttings were made in 1927 and 1928, those receiving 150 pounds muriate of potash at seeding and a similar top-dressing in 1928 have outyielded the check plots by 1,761 pounds.

The field on which these plots are located was a worn-out hay field, unplowed areas of which yielded less than 400 pounds of hay per acre in 1926. For a number of years prior to its use for experimental purposes the field had not been cultivated.

The area on which alfalfa was seeded was plowed in the fall of 1925, limed and manured in the spring of 1926, harrowed until June, and seeded June 23. No crop was harvested that year, the first cutting being made in June, 1927.

### *Increased Yields*

A basic treatment of two tons of ground limestone and 20 tons of manure was made over the whole field, then certain plots received two additional tons of lime, 20 more tons of manure, nitrate of soda, superphosphate and potash, alone and in combination so that a fairly complete test of these materials is under way. In all there are 12 different combinations of treatments, with one check plot in every four, making 48 twentieth-acre plots in all.

Thus far, potash has been the chemical which has given the greatest increase in yield. In fact it has stimulated the yield of alfalfa almost as much as 20 tons of manure where the increase has been 2,082 pounds for the four cuttings.

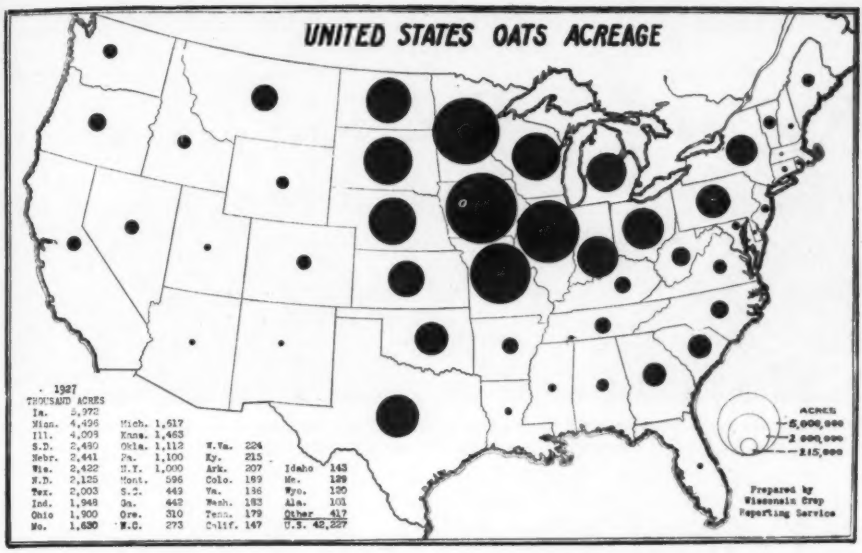
The increases from both potash and manure have been consistent, showing a greater yield in every cutting.

The increases as recorded probably do not tell the whole story, for the alfalfa grown with potash has stood up much better than that which has received heavy applications of manure, particularly in the first cuttings. When alfalfa lodges, the under leaves mould, and in extremely wet weather such as that which prevailed in 1928, the stems begin to decay. In this event weights do not give an accurate measure of feeding value.

### *Winter-Killing*

No winter-killing has been experienced on these plots except where small patches of ice stood at some time during the winter of 1927-28. There was no correlation between this difficulty and fertilizer treatment. If, however, potash should prove to be valuable in future years in preventing winter-killing, as it has in certain other experimental tests, it should prove to be doubly valuable as an alfalfa top-dressing.

Summing up our work in this experiment so far, it would seem that where manure has been used at seeding, or on the crop before, that first attention should be for the potash content of the fertilizer both at seeding down and for later top-dressings.




# OATS

¶ *Fourth of this series*

## *By Walter H. Ebling*

Agricultural Statistician, Wisconsin

THE story is told that an early English dictionary defined "oats" as grain used in England as a food for horses and in Scotland for men. Whether or not this is still true is not much of an issue today, for the world produces enough oats to provide both man and beast with generous shares. Oats, though one of the world's most important grains, does not enter extensively into our commerce, but is in the main consumed where grown, it being produced largely as a feed crop. A minor use for human food, particularly in the form of breakfast cereal, is of course well known. Oat flour too is made and was commonly used as a substitute for wheat in the World War.

There are two large oat producing areas in the world—the one in the United States which is heaviest in the Corn Belt and extends northwestward and northeastward into the Canadian Provinces, and the other in Europe which covers a very large part of the continent and extends eastward into Asiatic Russia. Only minor areas are found in other continents of the world. The oats in Europe is spring sown and often used extensively on the regions of poor but moist soils to which it is better adapted than other grains.

The United States grows about one-third

(*Turn to Page* 52)

**Farmers examining a top-dressing demonstration at Sandersville, Ga., where $1.60 worth of muriate of potash returned $13.30 in extra seed cotton.**

# Top-Dressing Cotton with Potash

*By Sid Noble*

IN the southeastern cotton belt the comparatively new idea of giving cotton supplementary applications of potash as top-dressings is apparently coming into real favor. The practice seems to gain impetus in proportion to the number of farmers who try it.

Three years ago potash top-dressing demonstrations on cotton were started on a small scale under the supervision of J. N. Harper and H. T. Maddux of the Agricultural and Scientific Bureau of the N. V. Potash Export My. In 1927 the demonstrations were increased to 40 and placed on farms in North Carolina, South Carolina, Georgia, and Mississippi. The results were amazing. Each $1 invested in extra potash returned an average of $8 in extra seed cotton.

Such results were good reasons for extending the demonstrations in 1928 to more than 200 farms in 11 states, with most of them concentrated in southeastern states. This increased the aggregate area of test plots for the three years to a total of nearly 2,500 acres.

The excellent promise of the beneficial results to be obtained from top-dressing cotton with extra potash as indicated by the two previous years' results, was well fulfilled by the results from the increased number of tests in 1928.

### *$5.50 for $1*

For the three years, where potash top-dressing was applied in addition to the farmers' regular cotton fertilizer, it increased yields on 95.5 per cent. of the farms. An average of about $5.50 in extra seed cotton was obtained for each $1 invested in extra potash. The farmers found that they could profitably apply an average of 3½ times as much potash to cotton as they had applied in the past.

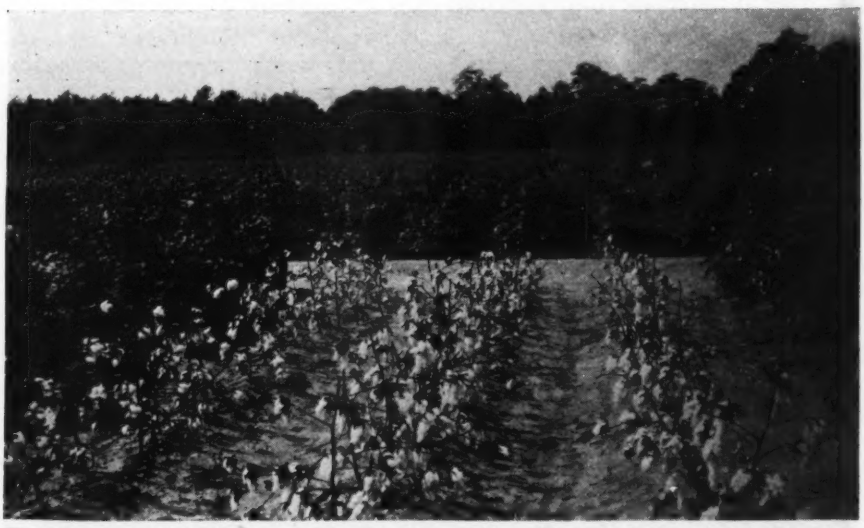
In spite of the handicaps of excessive rain, boll weevil, and tornado damage, the top-dressed plots averaged more than 1,000 pounds of seed cotton per acre.

Every effort was made to carry on the demonstrations under average field conditions on average soils. Each demonstration received the same cultivation as the cotton on the remainder of the farm. Two plots of uniform land were selected on which the previous fertilizer treatment and cropping system had been the same. To both plots the farmer applied his regular cotton fertilizer. Just after chopping he top-dressed one plot with potash, the amount varying from 50 to 128 pounds of muriate of potash per acre. On some farms kainit was used.

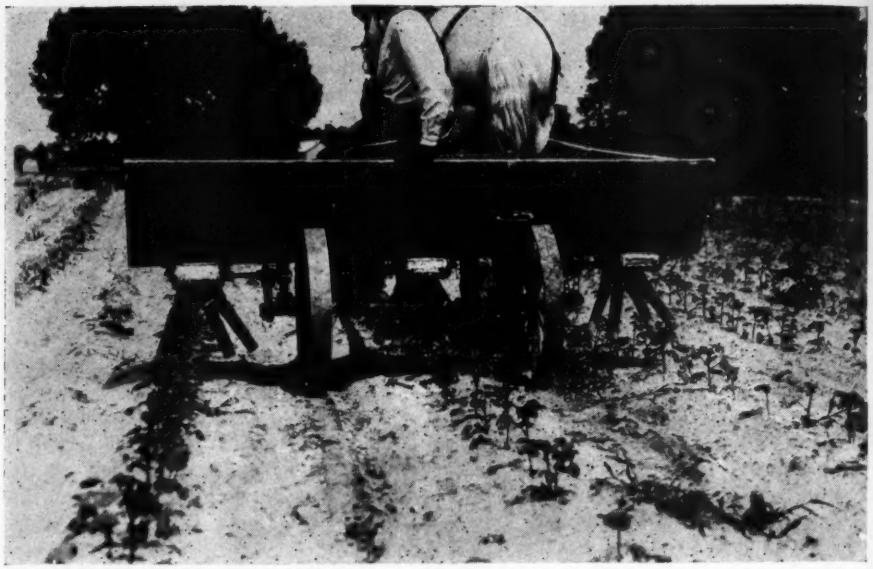
In most cases the plots were one-half to one acre in size. However, in many instances a potash top-dressed tenant farm of 15 acres of cotton was compared with another tenant farm of equal area and as nearly uniform conditions as possible but not top-dressed with potash. This was done to determine whether or not the potash top-dressing idea was applicable to the average southern farm unit—the tenant farm.

Demonstrations were placed on all of the major cotton producing soils of the South. These varied from clay loams and silt loams to sandy clay loams, sandy loams, and sands. Some demonstrations were on alluvial loams and limestone soils. Potash top-dressing gave good results on all of these soils. In fact it appears from the results that the previous fertilization and cropping of a particular soil has as much influence upon its response to potash as does the soil type itself.

The effect on a soil of previous methods of fertilizing and cropping is illustrated by a demonstration on the Taylor Farm at Summerville, Ga. The soil, a silt loam lying along a stream, had produced corn for several years without being fertilized. When the cotton was planted, 800 pounds of 12-4-4 were applied to three plots. Plot 1 was a check. Plot 2 was top-dressed at chopping with 64 pounds of muriate of potash per acre. At the same time plot 3 was top-dressed with 128 pounds of muriate of potash per acre. Plot 1 yielded 1076 pounds of



**This cotton on the farm of Cokers Pedigreed Seed Co., of Hartsville, S. C., has been fertilized for three years with 700 lbs. of 10-3-3 and top-dressed with nitrate of soda and potash. The three rows in the foreground have had their leaves picked off to show how much open cotton is on the stalks throughout the entire field. In spite of the fact that the stalks are fast maturing fruit they are still green and growing, and have not shed their leaves.**



Mr. W. T. Moss of Youngsville, N. C. rigged up a new kind of distributor for putting out his potash top-dresser.

seed cotton per acre; plot 2 yielded 1242 pounds; and plot 3 yielded 1746 pounds. Although the cotton on plot 1 received 800 pounds of fertilizer containing 4 per cent potash it began to show signs of rust early and toward the close of the season many immature bolls were noticeable.

A study of the demonstration results shows that on heavy clay soils small additions of potash gave no apparent returns while large applications gave outstanding yield increases.

(*Turn to Page 57*)

Mr. John R. Witt (right), Alabama Master Farmer, examining his 20-acre plot, top-dressed with potash.

# Potash *for* Potatoes

*By F. L. Musbach*

Professor of Soils, Wisconsin College of Agriculture

THE humble tuber ranks high as a source of cash income in Wisconsin. In 1927 the farmers of the State derived 18¼ million dollars for the crop from 260,000 acres, an average of $70.00 per acre. The crop is grown in every county of the State, but the bulk of the surplus comes from a number of developed centers in which the crop is grown intensively. Good cultural practices are followed by these growers. The yields are also considerably higher in these areas, as witnessed by the 10-year average acre yields for 1917-1926:

| | Bushels |
|---|---|
| Average for the State | 107.4 |
| Langlade county (N. E. Section) | 141.0 |
| Barron county (N. W. Section) | 122.1 |
| Waupaca county (Central) | 115.3 |

In these sections, represented by the counties enumerated, fertilizers are depended upon to assist in making the better crop yields obtained. In Langlade county in 1928, 2,800 tons, Barron county 600 tons, and Waupaca county about 500 tons were used. While some of this tonnage is used on crops other than potatoes, yet this is the crop chiefly fertilized.

Potato growers are keenly interested in fertilizer analyses, and during the past five years a marked change in not only the kinds, but also the amounts to use, has been brought about. Prior to 1922, the 3-8-6, 3-10-3, and similar ratios were considered "potato specials." In 1922 the popular 5-8-7 was introduced and this brand is at the present time one of the most widely used fertilizers. In 1923, the 3-10-10 was licensed, and in the years following other analyses carrying relatively more plant food per ton have been introduced.

Some of these changes have been brought about by the experiences and results secured in other states. The 5-8-7 came from Aroostook county, Maine, where this brand has been found popular and used to the extent of about 90 per cent of the total fertilizers consumed. In this connection

## POTASH MADE MORE NO. I's

| No. | Treatment | Acre Yields in Bushels | | |
|---|---|---|---|---|
| | | Barron Co. | Langlade Co. | Price Co. |
| | | No. 1's | No. 1's | No. 1's & No. 2's |
| 1 | Manure | 47.9 | 182.6 | 166.3 |
| 2 | Manure & 4-8-6 | 135.5 | ..... | ..... |
| 3 | Manure & 5-8-7 | 143.6 | 364.7 | 280.7 |
| 4 | Manure & 3-8-7 | 137.4 | 390.8 | 301.6 |
| 5 | Manure & 3-8-10 | 150.3 | 434.9 | 306.0 |
| 6 | Manure & 3-10-10 | 168.3 | 435.5 | 302.2 |
| 7 | Manure & 3-12-12 | 185.8 | 481.2 | ..... |

it might be stated that any particular combination under one set of conditions may not be the most profitable in another section where conditions of soil, methods of farming, etc., may be quite different.

In order that first-hand information might be obtained as to kinds of fertilizers which produce highest yields, trial plots were started in a number of the intensive districts of the state. In the table are indicated the yields for various treatments for 1928 in three of these sections.

### *Barron County*

The field on which this test was conducted had been cropped from 30-35 years. About 10 loads of manure top-drest on clover sod were plowed under. Soil is a silt loam with heavy subsoil. The yield of U. S. No. 1's (Cobblers) on the manured plot is low, due chiefly to the unfavorable weather conditions in the fore part of the growing season. June was decidedly cool and 50 per cent above the average rainfall fell. The plots receiving 500 lbs. of commercial fertilizer in addition to manure, however, were not affected in like manner, though the yields were reduced. Perhaps one of the best insurance policies against loss from the elements is the use of fertilizer, and farmers who were present at the time the plots were harvested appreciated this fact. Each of the various brands were used at a profit even when the increased yield, due to fertilizer, was valued at 30c per bushel—the market price when the crop was harvested.

The table also reveals the need of higher potash analyses under the conditions obtaining the past year, confirming the results obtained on similar soil in the county in 1927. Whether even higher potash fertilizers may be used profitably remains to be worked out in the future.

Five years ago the Almena growers (Barron county) began the use of fertilizers and each year its use has increased. In 1928, 26 carloads were distributed in the district.

### *Langlade County*

This county is one of the most intensive potato growing sections of the state. In fertilizer tonnage the county ranks at the top. The 1928 test plot was on typical Antigo silt loam. The field had been cropped 30-40 years, was in pasture and manured in 1927, but received no further manure for the crop in 1928. Excellent yields of Cobblers (U. S.) No. 1's were secured as indicated in the table. The use of commercial fertilizers at the rate of 680 lbs. in the row has been found profitable. The seasonal conditions were unfavorable as was the case in Barron county, and illustrates again the importance of abundance of quickly available plant food when needed in order to secure highest yields. This soil again indicates a potash deficiency as indicated by comparing plots 4, 5, and 7. In plot 7 the higher phosphorus content also may have been a factor in producing the yield approaching the 500-bushel mark. Whether the potash limit has been reached is an unsolved question. Another pertinent query related to it is whether both the nitrogen and the phosphorus should be increased when the potash is boosted. This problem of ratios of plant food is indeed an important one, and much remains to be done in solving it. From the data now available it appears, however, that the potassium content of the mixtures such as 4-8-6 and 5-8-7 is not sufficient for maximum yields. Then too, under our diversified conditions of growing the crop, less nitrogen seems to be required.

### *Price County*

Price county farmers are interested in Triumphs, chiefly, in supplying the Southern seed trade. The crop in 1928 was grown on sandy loam soil, ideal for potatoes. The land has been cropped less than 25 years,

## HIGH POTASH MADE BEST YIELDS

| Treatment | Barron Co. | Langlade Co. | Price Co. |
|---|---|---|---|
| Manure | 47.9 | 182.6 | 166.3 |
| Manure & Medium Potash Av. Plots 2, 3, 4. | 138.8 | 377.7 | 291.1 |
| Manure & High Potash Av. Plots 4, 5, 6. | 168.1 | 450.5 | 304.1 |

and has been maintained in good state of fertility. Clover is grown regularly. In 1927 a good second crop was turned under and 10 tons of manure disced in in the spring of 1928, supplemented by 500 lbs. of commercial fertilizer. In the table is shown the yields of the total crop, both No. 1's and No. 2's. Again it will be noted that the fertilizer supplement with manure served to boost the yields very handsomely. Some inconsistencies appear in the results, yet the results as a whole show the imperative need of supplying plant food with liberal proportions of potash.

In the table above is given a summary based upon the previous table.

In the table 6-7 per cent potash fertilizers have been designated medium, and 10-12 per cent goods as high. These are purely arbitrary terms and further work may show profit with even higher potash analyses. In fact a number of results in the Langlade county district have shown best yields from the use of fertilizers carrying 18 per cent of potash.

In the Barron district the high potash goods showed an increase of 29.3 bushels over the medium, in Langlade 72.8 bushels and in Price, 13 bu. It should be stated that these results are secured from soils which have not been subjected to heavy potash fertilizing. The continued use of high potash fertilizers may in time show less response to potash. This much appears certain, that fertilizer analyses can not remain static. The conditions under which potatoes are grown change. This applies not only to soil, but cultural practices as well. In Aroostook county, Maine, late results secured by the Experiment Station show that higher nitrogen fertilizers are indicated. The Maine growers are now using 5 per cent ammonia materials. It is only by continued study of this problem in the potato belts that worth while information may be secured on this very important phase of the potato business.

**The results of three Barron county, Wisconsin, tests. All of the plots received 10 loads of manure. The blank is the manure plot only which yielded 48 bushels of No. 1's per acre. The plot at the left, in addition to the manure, received 500 pounds of a 3-10-10, and yielded 168 bushels per acre of No. 1's. The center plot received, in addition to the manure, 500 pounds of a 3-12-12, and yielded 185 bushels of No. 1's per acre.** **(See table on page 17.)**

New road cuts and ditches are always welcomed by the soil survey man. From these he can obtain the best possible idea of the surface soil, subsurface, and subsoil, the underlying strata, and also the color, texture, and structure of these.

# Agriculture Today

## V. Soils and Fertilizers

*By Frank George*

INCREASED farming efficiency through greater production per acre and per man is regarded as one of the notable agricultural achievements of the past decade. In a time of increasingly fierce marketing competition, farmers have striven for lower costs of production through increased acreage yields and mechanized labor.

Fundamental prerequisites of increased crop yields, according to Dr. A. G. McCall of the Federal Bureau of Chemistry and Soils, are a knowledge of the soil and what it can be made to yield. To date, more than half the arable land of the United States has been surveyed for this purpose. Using the soil survey as a basis, the Division of Soil Fertility is engaged in determining the fertilizer requirements of the different soils and the application of these results to different crops and cropping systems.

In the more recently settled sections of the country, Dr. McCall says,

the soil survey reports and maps are used largely by new settlers in the selection of suitable farm lands. In the older agricultural sections, farmers are using the surveys in studying the soils of their farms and in planning soil management practices for increased acre crop production. County agricultural agents are using the surveys to advise farmers with regard to specific farm practices suited to the various soil types and soil conditions. Experiment stations and agricultural college workers are using the reports in locating outlying experimental fields.

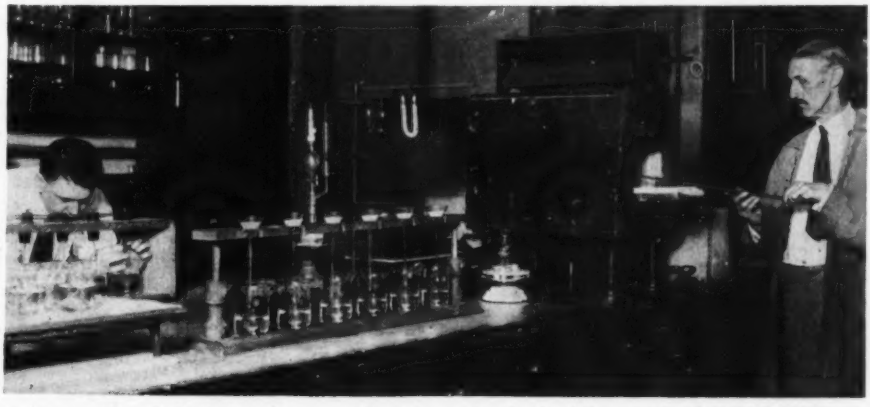
The results of a soil survey recently made of an area in southeastern Idaho tended to discourage the promotion of a proposed irrigation district. Facts brought out in a survey in Eldorado county, California, aided in the identification of lands suitable for the extension of the pear-growing industry. A survey of the Chico area in California has shown that some soils which have decidedly calcareous subsoils are closely associated with a serious physiological trouble experienced the past few years in prune orchards, locally known as "die back."

In southeastern Ohio, hillside slipping of soil and subsoil materials in the extensive Upshur soils of that region has demolished sections of recently laid concrete roads. Field investigations showed the necessity of determining the character of peculiar properties of the soil materials in relation to the proper construction or treatment of highway subgrades in order to prevent future damage to roads under similar conditions.

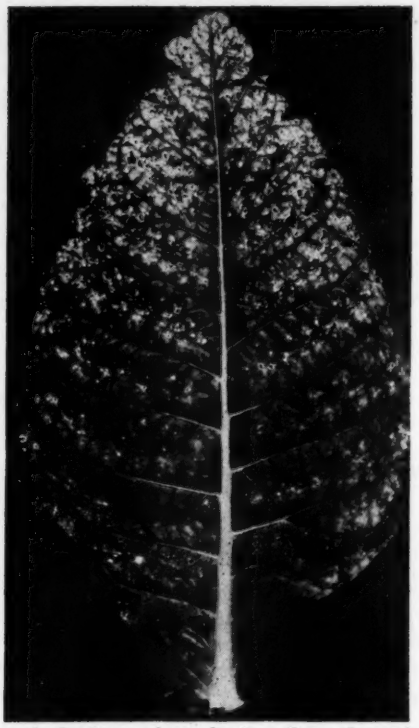
A nation-wide plan looking to the best utilization of American soils has been formulated by Dr. McCall, the basis of which is an inventory of the soil fertility of the country and an accounting of the particular assets and liabilities of the soils by regions and, more intensively, by States. The program includes the completion of the soil survey already in progress, fertilizer research based on the soil survey, a study of methods for the control of soil erosion, and a survey of the soil organic matter of the United States.

The cooperation of the States is urged in this program, in measuring the value of the soils and soil types in practical terms of agricultural production in each of the great soil regions of the United States, long enough to make possible, through accumulated data, the elimination of accidental and temporary conditions which control crop yields.

For better and more effective use of fertilizers, Dr. McCall would divide the agricultural areas of the United States into nine regions on the



**A large number of chemical analyses must be made to classify the different soils of the United States.**



**Leaf of tobacco plant, showing effects of potash hunger, particularly the loss of green color which begins at the tip and margins and advances toward the base. Numerous small yellow or brown specks usually appear in the bleached areas, and these tend to grow together, forming large blisters. The dead tissue eventually breaks, forming ragged edges and holes between the veins.**

basis of soil relationships, climate, and agricultural practice, with the scientific data on these regional differences, as recorded in the soil surveys, the foundation for further studies and practical adaptation of fertilizers to soils.

The work of the regional director would be supported in each State in his region, while the State would be expected to furnish assistant agronomists to carry out the State's part of the program. The County Agent would cooperate in the selection of the experimental fields and take the work to the farmers by arranging local meetings and inducing the farmers to visit the experimental fields.

"Under our present economic conditions," Dr. McCall says, "agriculture must continue to depend in a large measure on the organic matter of the soil to supply the nitrogen and the necessary conditions within the soil, and so long as these conditions prevail, soil organic matter will continue to be synonymous with soil fertility." He declares there is an annual loss of 9,000,000 tons of nitrogen from the soil, of which amount only 260,000 tons are now returned in the form of commercial fertilizer.

### *Soils and Plant Diseases*

One important phase of the newer soils research work concerns the relation of soil types to the development and spread of plant diseases. Cooperative work with the division of plant pathology of Texas during the past field season covered a study of the relationship of soil types to root rot of cotton. Preliminary results indicated a definite relation between certain soil types and the development and spread of this disease in Texas.

Recent studies of the chemical properties of soils have shown that laboratory examinations of the exceedingly fine particles known collectively as soil colloids can be used for predicting how soils will behave under given cropping systems and in certain engineering projects, such as road building. Closely correlated with the chemical work, the soil-physics laboratory is making investigations of the important physical properties of the soil, such as moisture relations, aeration, heat absorption, texture, and the physical effects of different amounts and proportions of colloidal material.

A recent study of the use of fertilizers on tobacco is an example of the type of practical soil and fertilizer research now being conducted by the Federal Department of Agriculture. The general conclusion reached in this study was that "it is true that tobacco plants may attain good size when supplied with only comparatively small quantities of potash, but the leaf produced is likely to be of

poor quality and perhaps light in weight.

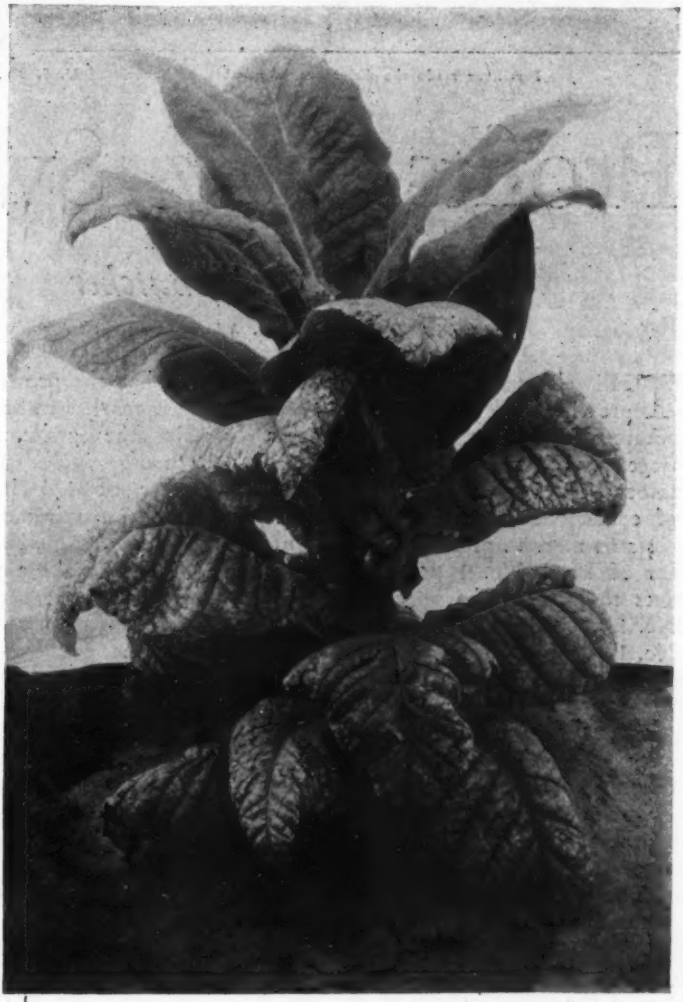
"The plant must develop a large leaf area within a short period of time, and potash is an efficient aid in maintaining the health and vigor of the leaf. Without sufficient potash the leaf begins to lose its normal green color, especially at the tip and along the edges, and soon small specks of dead tissue may appear. The specking may spread rapidly over the leaf, many of the specks uniting to form large spots of dead tissue, and because of uneven growth the leaf surface becomes rough and puckered.

"The tip and edges of the leaf tend to curve downward and often the edges become broken and ragged. The quality of the product is greatly injured when these symptoms of potash hunger develop. Evidence of potash hunger commonly begins in the lower leaves of the plant, but may occur on plants of large size, and in this case only one or more of the middle leaves may show the diseased condition."

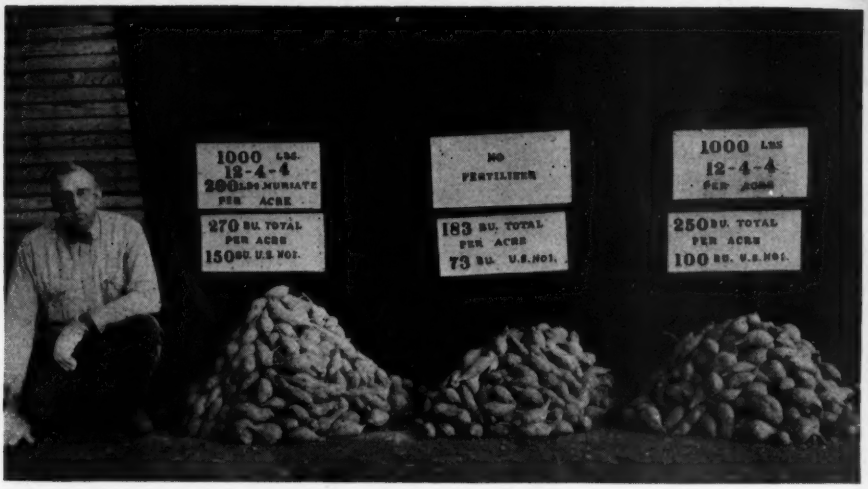
In the Connecticut Valley where heavy fertilizing of tobacco is practiced, ample supplies of potash are usually used. In most other sections, and particularly on the lighter sandy soils of southern tobacco-growing districts, the investigators declare, experiments indicate that somewhat more potash than is now generally used would give profitable returns.

"Even where no symptoms of disease are seen," say the Federal experts, "an increased supply of potash may improve the quality of tobacco. A liberal supply tends to give a smooth leaf of fine texture which 'fills out' better in ripening. For smoking

(*Turn to Page* 52)



**A plant of Maryland tobacco suffering from potash hunger.**




**Fertilizer made the difference in number of bushels of U. S. No. 1's.**

# Profits *from* Sweets

## *By H. K. Thatcher*

Former District Extension Agent, Arkansas College of Agriculture

THE element of success in the growing and marketing of sweet potatoes is in being able to produce a large per cent of merchantable potatoes. The cost of production must, of course, be at a minimum, but it costs no more to produce a large number of U. S. No. 1 potatoes than it does to produce the same number of No. 2's. In most cases it is the U. S. No. 1 eating potatoes that bring in the money to the producer, although sometimes seed potatoes can be sold at a good price and the culls can be fed to livestock with profit. Most growers depend upon the eating potatoes that they can sell for their profit, and it is to the production of this type of potatoes that our thoughts are directed.

The United States grades for No. 1 potatoes specify, within certain limits, in size and quality of the No. 1 grade. There is such a wide range between the limits in size of the No. 1 grade that the grower who desires to top the market must size his potatoes within the grade. The minimum length of 4 inches and the minimum diameter of 1¾ inches, contrasted with the maximum length of 10 inches and the maximum diameter of 3½ inches, make a grade that is not pleasing to the average buyer. The grower must either separate the sizes within the grade or handle his production in such a manner that he gets uniform size potatoes.

There are other things than uniformity of size to be considered if the potatoes are to meet the grade requirement and present a pleasing appearance to the buyer. They must be smooth of skin, regular in shape, and free from any serious defects or diseases. In a word every potato must be in such a condition that there is no waste when cooking and eating.

(*Turn to Page* 44)

# Corn Chlorosis

*By J. P. Jones*

Research Professor of Agronomy, Massachusetts Agricultural College

A STRIPING of the leaves, the tissue between the veins turning yellow, the tissue immediately surrounding the veins remaining green, these briefly are the symptoms of magnesia hunger in its early stages on corn.

In the later stages the symptoms become more magnified, with the intervascular tissue losing practically all its color and finally turning brown as it approaches death. The yellowing spreads to include most of the vascular tissue.

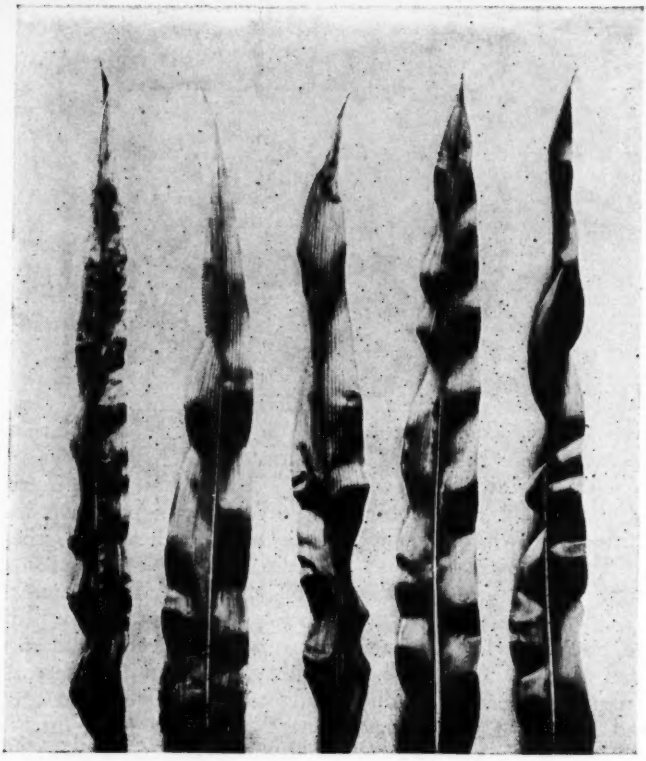
In the quite severe cases the leaf appears with both the vascular and intervascular tissues near the border of the leaf brown and lifeless. Further removed from the border toward the midrib, only the intervascular tissue is brown and lifeless, the veins still retaining some of the green and yellow pigments. In the section nearest the midrib the intervascular tissue is yellow, still showing evidences of life, while the veins appear normal green in color. The final results of these disturbances in chlorophyll formation are early maturity and depression in yield.

Soil fertility men have not paid much attention to magnesia hunger on crop plants. This has been due to the fact that the amount of available magnesia contained in the soil, together with that added from time to time in the form of lime, sulphate of potash magnesia, and vegetable organic fertilizers, have been sufficient to supply the magnesia needed for most crops. The case described here occurred on one of the old fertilizer test fields at the Massachusetts Experiment Station and illustrates that unless magnesia is added in some form, its deficiency in the soil is likely to show itself in time.

Garner and his associates* have reported a similar case of magnesia starvation on tobacco to that observed at the Massachusetts Experiment Station on corn. They observed magnesia hunger, or sand drown, to be prevalent in many of the tobacco fields of the South and also in those of the Connecticut Valley. The leaf symptoms of sand drown are very similar to those of magnesia hunger on corn. The reason they appear quite different is due chiefly to the difference in the distribution of the vascular and intervascular tissues characteristic of the two types of plants. In tobacco the leaf is of greater economic importance than in corn and consequently injury to the leaf may be more serious The injury to the tobacco leaf generally affects quality more than yield. With corn the yield of grain is the principal economic character affected.

The field on which the chlorosis of corn was noted had been used about 30 years for a fertilizer test. The test consisted of a comparison between two types of complete fertilizer, one relatively high in potash and low in phosphorus, and the other relatively high in phosphorus and low in potash. The materials used were practically free of magnesia. The cropping system consisted of two years of corn followed by two years of hay. Although manure was a by-product of this system,

* Garner, W. W.; McMurtrey, J. E.; Bacon, C. W.; and Moss, E. G. Sand Drown, a Chlorosis of Tobacco Due to Magnesium Deficiency, and the Relation of Sulphate and Chlorids of Potassium to the Disease. Jour. Agr. Res. 23:27-40. (1923).



Showing variation in degree of magnesia hunger in corn leaves—leaves numbered from left to right: 1, extreme chlorosis; 2 and 3, medium chlorosis; 4, slight chlorosis; 5, normal green—non-chlorotic.

none was applied during the entire period. Lime was used at the rate of one ton per acre of air-slaked lime in 1900; at the rate of one ton per acre of agricultural lime in 1907; and on the north half of the field at the rate of two tons per acre of ground limestone in 1921.

Study to determine the cause of the chlorosis was undertaken in 1924. Preliminary observations showed the chlorosis to be confined chiefly to the south half of the field. The north and south halves of the field had been given the same treatments with the exception of the lime applied on the north half in 1921. The apparent reduction of the chlorosis by the use of lime suggested the possibility of aluminum toxicity being the cause. Lime had been shown by the Rhode Island and other work to be a corrective for aluminum toxicity. In further support of the aluminum hypothesis, the chlorosis was noted as being strikingly similar to that obtained by Hoffer* when solutions of aluminum salts were injected into the corn plant.

The possibility of a disease being a factor in causing the chlorosis was also given consideration. Observations were made and no disease that might be considered the casual agent was found.

The chlorosis appeared to be a response due to the lack of some essential nutrient. The commonly deficient nutrients, nitrogen, phosphorus, and potassium, were adequately supplied in the fertilizer applications. In view of the work of Garner and his associates with tobacco, magnesia was suspected as being deficient. The conditions which were described as favoring sand drown were quite comparable to those under which the chlorosis of corn developed. The lime applied in 1921 contained about 5 per cent magnesia. This suggested another possible explanation of the effects of lime on the chlorosis.

In attacking the problem, attempt was made to show that the lime either prevented the chlorosis through counteracting aluminum toxicity or

* Hoffer, G. N.; and Carr, R. H. Accumulation of Aluminum and Iron Compounds in Corn Plants and Its Probable Relation to Root-rots. Jour. Agr. Res. 23:801-823. (1923).

Table 1.—Influence of Lime and Magnesium Sulphate on the Proportion of Chlorotic Hills.

| Treatment | 1924 Per cent | 1927 Per cent | 1928 Per cent | Average Per cent |
|---|---|---|---|---|
| Limed | 1.40 | 4.18 | 17.21 | 7.60 |
| Unlimed | 65.33 | 80.16 | 90.12 | 78.54 |
| Magnesium sulphate | 22.72 | 10.79 | 2.25 | 11.92 |
| Limed+magnesium sulphate | 1.94 | 2.39 | 3.38 | 2.57 |

through furnishing needed magnesia. To do this, cross treatments of magnesium sulphate were made in the field. In the greenhouse corn was grown on soil known to produce chlorosis in the field, treated with chemically pure lime, with magnesium sulphate, with agricultural lime containing about 5 per cent magnesia, and with high applications of superphosphate. Chemical analyses were also made of the chlorotic and non-chlorotic plants taken from the field.

The results of the field work are summarized in table 1 to show the effect of lime, magnesium sulphate, and the combination of lime and magnesium sulphate in overcoming the chlorosis. In order to evaluate the effects of the different treatments, counts were made of the chlorotic and non-chlorotic hills. Four plots were averaged each year to give the figures shown in the table.

In 1924 when lime was used, the proportion of chlorotic hills was so small as to be negligible; in 1927 there was a slight increase; and in 1928 there was a very noticeable increase. If lack of magnesium be the cause of the chlorosis, the increase of 1928 is what might have been expected. The magnesia applied in the lime about eight years before was probably becoming exhausted. In cases of low available magnesia, heavy rainfall, such as that of the growing season in 1928,

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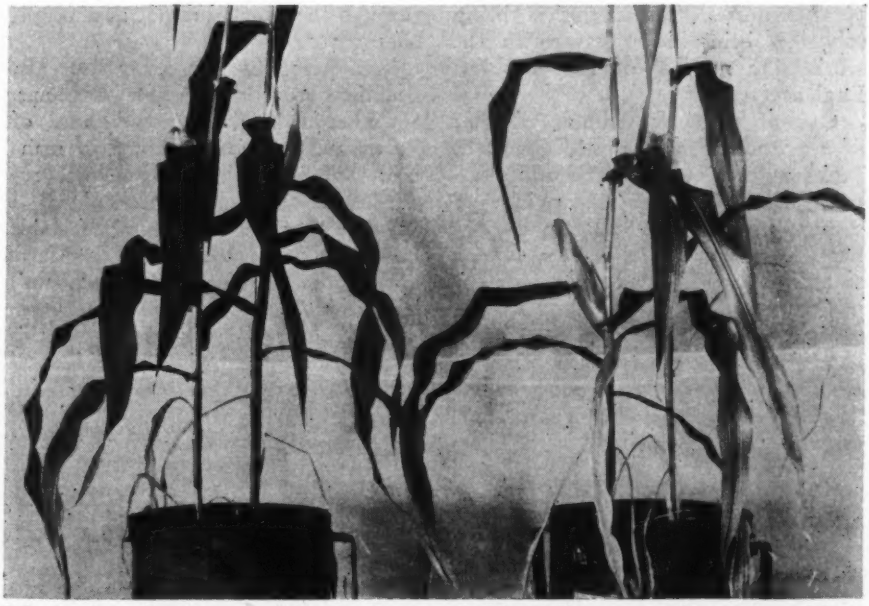


**Soil taken from chlorotic area in field. To the pot on the left 400 lbs. per acre of magnesium sulphate were added. The pot on the right received no magnesium sulphate.**

Mr. Peckham plowing down rye to enrich the soil of his "Garden in the Woods."

# *Farming* Without Manures

## *By A. E. Wilkinson*

Professor of Vegetable Gardening, Connecticut Agricultural College

WITH the increased scarcity of stable manures and the ever rising price of this commodity, gardeners are faced squarely with the task of raising vegetables without natural manures. How this is being solved is being demonstrated in the work of a number of men in New England.

One of the best examples is that of a friend of mine named Frank E. Peckham of East Norwich and Preston, Conn. I say East Norwich and Preston because Mr. Peckham lives in East Norwich, but the farm I wish to talk about is located six miles away in Preston.

Six or seven years ago, Mr. Peckham found in a wooded section of Preston 24 acres of pasture and meadow which had particularly valuable features for vegetable raising. There were some brush on this land and some trees; some of it was in a very high state of cultivation. These were the bad features. Very few men, therefore, would have selected it for vegetable raising. The good features were a sandy loam with a very high water table, land which was level, easily cultivated, without stone, and a location that was ideal because very few could find it as it was more than one-half mile from a state road through the woods and not near neighbors.

This was too far away for Mr. Peckham to draw stable manures. Since he had given up the use of horses and the family cow, no manures were available from home sources, and he said he would not buy. I am sure that not one pound of stable manures has been used on this farm during the period of Mr. Peckham's ownership.

There were a few spots on this farm, so low that water would stand in them after heavy rains, that needed draining. About 1,500 ft. of tile were placed in these low areas, and adequate drainage was given.

The first year the trees were taken out, the brush cut and burned, and the entire soil plowed, harrowed, limed, fertilized, and a soil improvement crop planted. Buckwheat was

(*Turn to Page 56*)

# Record Tomatoes

*By G. R. Cobb*

Salisbury, Maryland

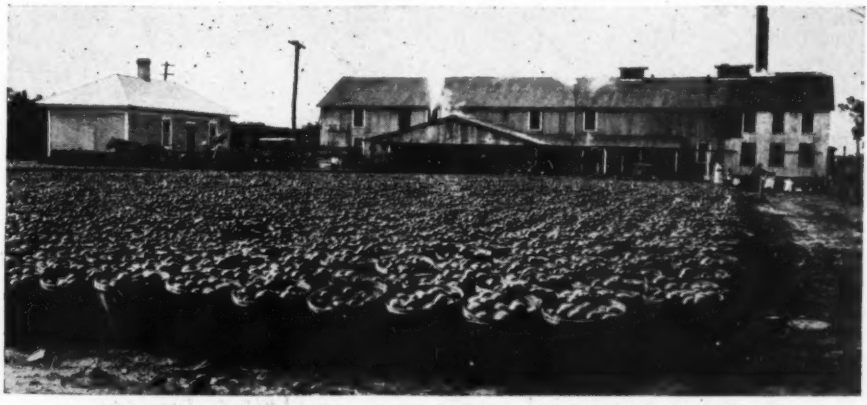
THE average yield of canning tomatoes on the Eastern Shore is about 200 baskets (5/8 bushel) or 3-1/3 tons. But the Smith family, Allen, Maryland, well-known truckers, far surpassed this yield when they produced 5,154 baskets on 10¼ acres. This is an average of over 500 baskets per acre or more than twice the average yield on the Shore.

Instances are numerous where larger yields have been secured from individual acres, but so far as any record can be obtained, this is the largest yield ever produced on a piece of land more than 10 acres in area. It is much easier to produce a large yield on one or two acres than it is to raise a similar amount on large areas.

In talking with Marion Smith, the fact was brought out that he and his co-workers believe that tomatoes need much more potash than is being used by the rank and file of growers. On this particular piece of land a mixture analyzing 4 per cent nitrogen, 8 per cent phosphorus and 10 per cent potash was used direct on the tomato crop; but the field received, during the season, 600 pounds of a 5-8-5 mixture, the same amount of a 6-6-6 commercial fertilizer plus 600 pounds of the 4-8-10 mixture.

This 10-acre plot was first planted to beans and before the beans were harvested tomatoes were set between every other row, thus following the "companion cropping" method which affords more than one crop on the same piece of land at the same time. Before the beans were planted, 600 pounds of a commercial fertilizer mixture analyzing 5-8-5 were applied, and later on during the growing season a like amount was used as a side or top-dressing, but this was higher in nitrogen and potash for it analyzed 6-6-6. Thus up to this time the land received 66 pounds of actual nitrogen, 84 pounds of phosphorus, and 66 pounds of actual potash, equivalent to

(*Turn to Page* 49)



**Here are 18,000 baskets of tomatoes ready for the use of a Maryland cannery.**

# *The* South's Convention

## *By R. H. Stinchfield*

UNDER sunny February skies, 1,500 agricultural workers from all over the South gathered in Houston, Texas, February 5-7, to discuss their problems, make plans for the future, and pay tribute to the pioneers in extension work. The meeting will be recorded as the 13th Annual Convention of Southern Agricultural Workers. It was more than that for it was the Silver Anniversary Celebration of Cooperative Demonstration Work.

The oldest member in point of service, George Banzaff, Milam county, Texas, who is accredited with the longest period of unbroken service of any county agent in the United States, was present to meet and shake hands with the youngest members. Mr. Banzaff, who began his work in 1908 in Milam county, is still serving that county as farm agent, a fine record of efficient cooperation.

Everyone seemed to know everyone else, and the most cordial spirit prevailed throughout the three-day meetings. As one correspondent saw it, "Bronzed agents, decked out in big hats of the Panhandle-Plains region, mingled with dapper county agents from Kansas and the eastern states. Grizzled veterans of the early work in Texas swapped experiences with the younger men and women agents who are on the firing line today spreading the doctrine of sound agriculture." High officials of the United States Department of Agriculture and directors and specialists from 22 states were registered among the delegations which made up the official attendance. The Cotton states were probably best represented as would be expected since Southern agriculture is so closely built around King Cotton.

### *Honor Dr. Knapp*

A dominant note of the general sessions was the tribute to Dr. Seaman A. Knapp, the grand old man of Southern extension work. To Dr. Knapp was given much of the credit for the present efficiency and importance of demonstration work. Almost every speaker, with reverence and pride, referred to the untiring effort of this pioneer worker.

The Ten Commandments of Farming upon which Dr. Knapp built his work were reviewed and accorded as safe and sound today as they were 25 years ago:

1. Prepare a deep and thoroughly pulverized seedbed, well drained; break in the fall to a depth of 8, 10, or 12 inches, according to the soil, with implements that will not bring too much of the subsoil to the surface.

2. Use seed of the best variety, intelligently selected and carefully stored.

3. In cultivated crops give the rows and the plants in the rows a space suited to the plant, the soil, and the climate.

4. Use intensive tillage during the growing period of the crops.

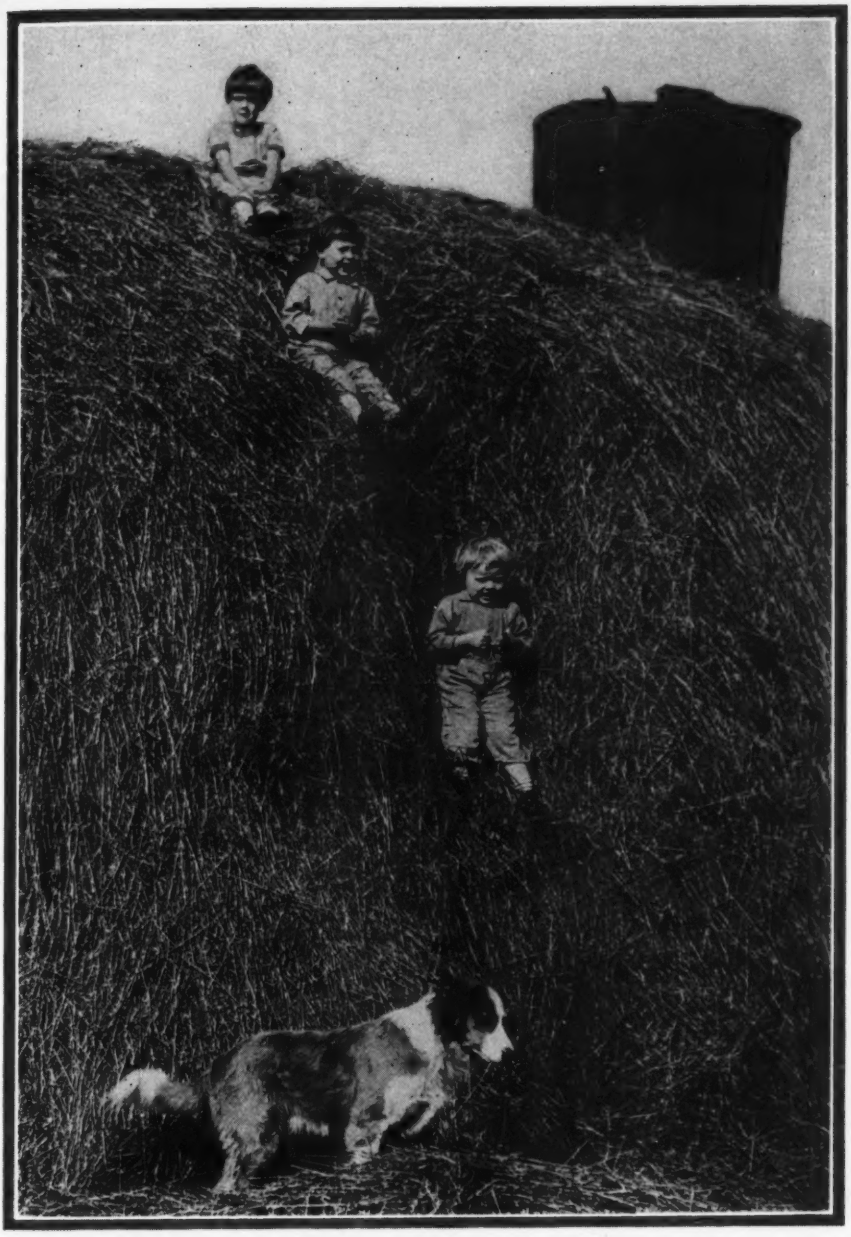
5. Secure a high content of humus in the soil by the use of legumes, barnyard manure, farm refuse, and commercial fertilizers.

6. Carry out a systematic crop rotation with a winter cover crop on Southern farms.

7. Accomplish more work in a day by using more horsepower and better implements.

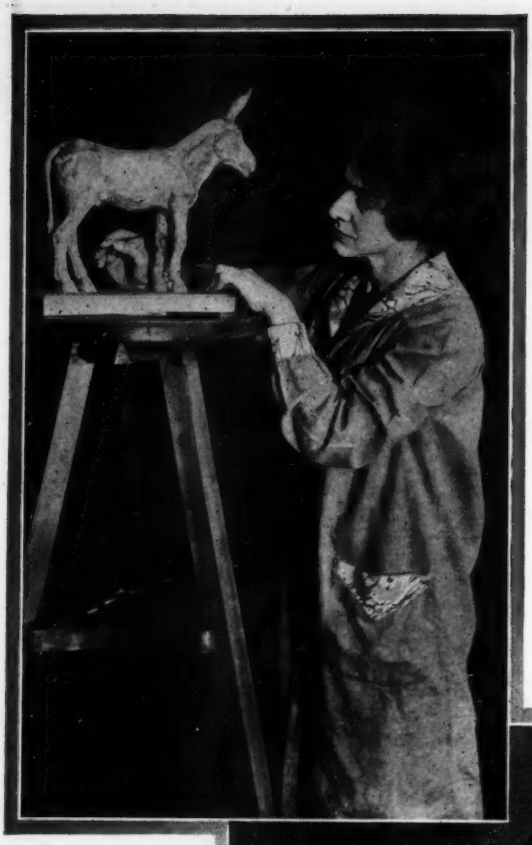
8. Increase the farm stock to the extent of utilizing all the waste products and idle lands of the farm.

(*Turn to Page* 54)

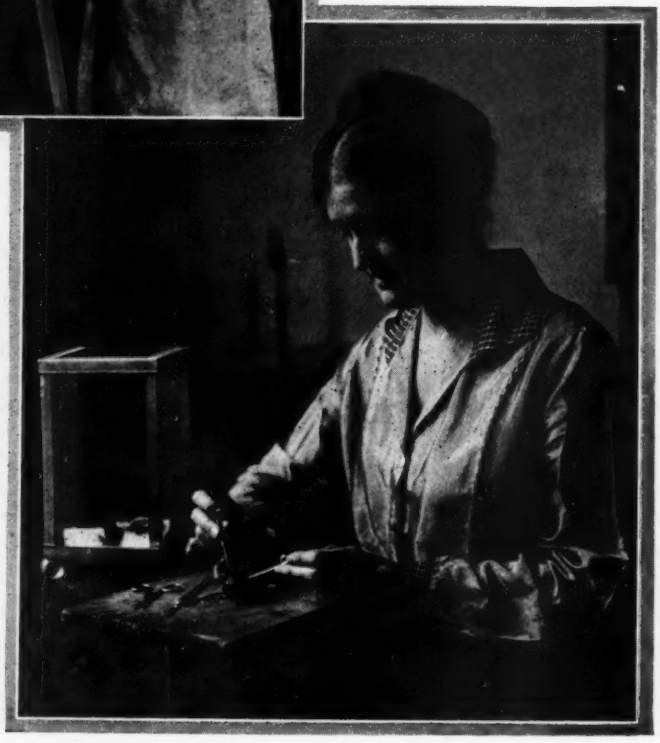


*Look out, below!*

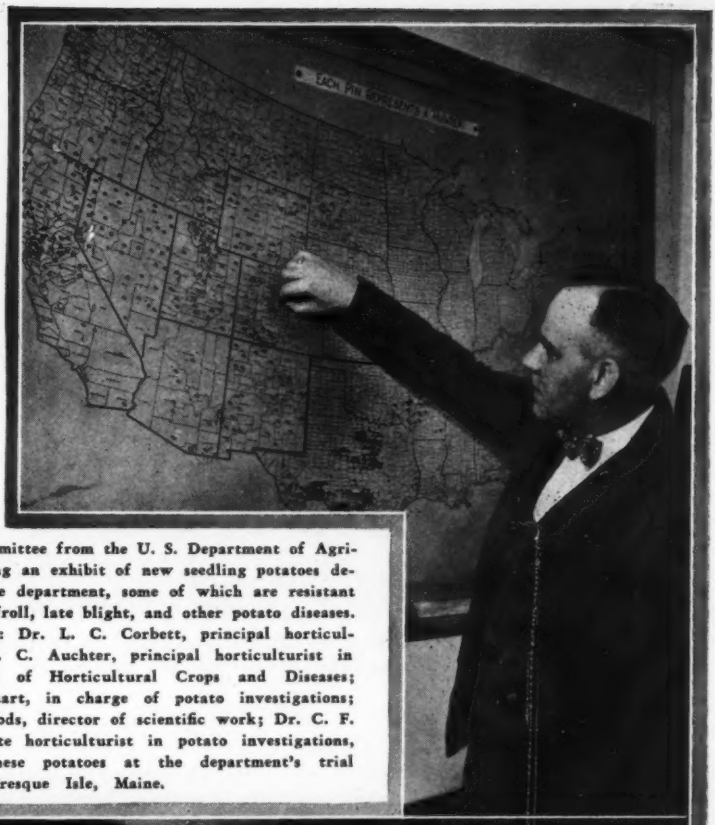
## PICTORIAL



Left: The American mule did not have its origin in Missouri as a great many people suppose. The mule population in this country was started by a Spanish jack presented to George Washington by the King of Spain and now thousands of mules are exported annually to Alfonso's country. This year the U. S. Department of Agriculture is putting on a big exhibit at the Ibero-American International Exposition at Seville, Spain, and one of the decorative features of a section of the exhibit is a model of the royal ancestor of the American mule. The picture shows Mrs. Margaret R. Roller of the Office of Exhibits, U. S. Department of Agriculture, putting the finishing touches on the model.



Right: Miss Eloise Cram belongs to the rather small group of women scientists. She is one of the helminthologists of the Bureau of Animal Industry, U. S. Department of Agriculture. In case you don't know what this particular "ologist" is, her work has to do with the internal parasites of animals. The results of her investigations are known to parasitologists in many countries.



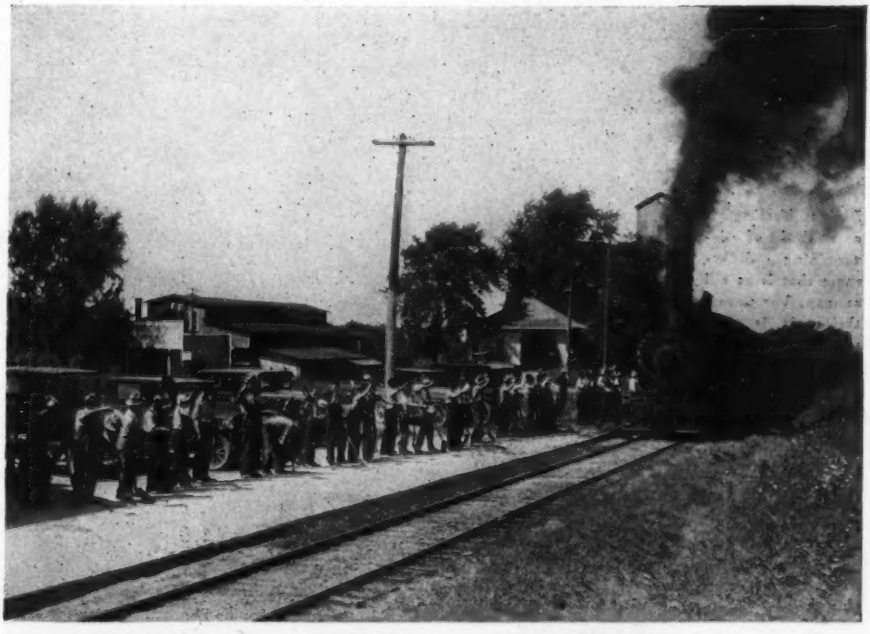
Right: Stanley P. Young of the Biological Survey, U. S. Department of Agriculture, who has charge of the Government predatory animal hunters. Each pin on the map shows the location of a hunter. Mr. Young, too, was once represented by a colored pin.

Below: A committee from the U. S. Department of Agriculture viewing an exhibit of new seedling potatoes developed by the department, some of which are resistant to mosaic, leafroll, late blight, and other potato diseases. Left to right: Dr. L. C. Corbett, principal horticulturist; Dr. E. C. Auchter, principal horticulturist in charge, Office of Horticultural Crops and Diseases; Dr. Wm. Stuart, in charge of potato investigations; Dr. A. F. Woods, director of scientific work; Dr. C. F. Clark, associate horticulturist in potato investigations, who grew these potatoes at the department's trial grounds at Presque Isle, Maine.

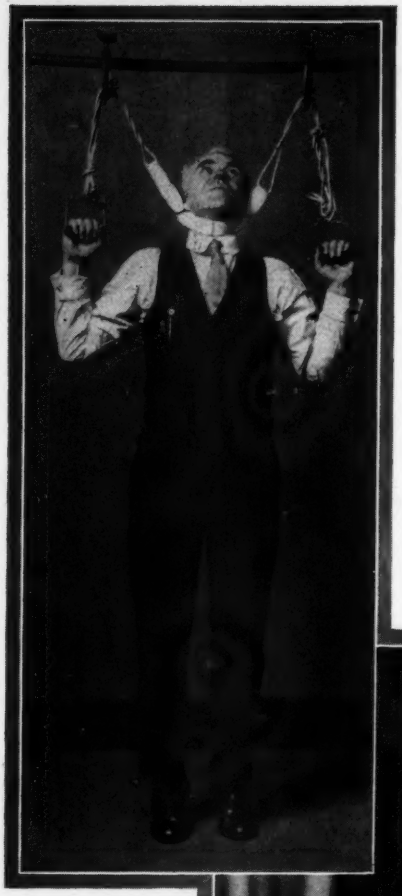
Scene in a cornfield showing the work of the stalk cutter and corn borer destroyer, a machine that is equipped with a rapidly rotating cutting drum which tears the cornstalks into inch lengths.

The machine, which was invented by David E. Ross and constructed by the Agricultural Engineering Department of Purdue University, is expected to do much to help keep the corn borer in check.

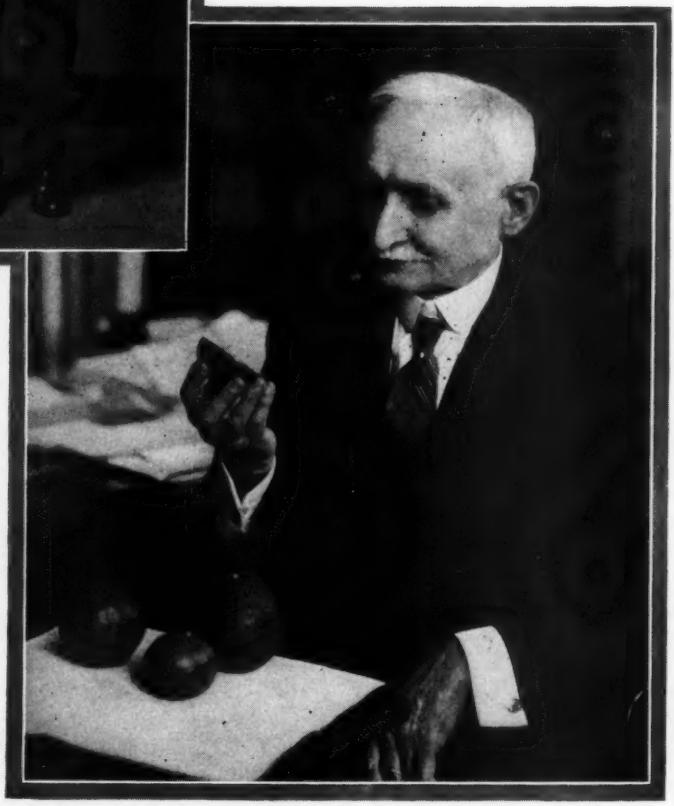
The winners in a Hoosier pest extermination contest in which some 300 youngsters were enrolled. It is figured that the saving to the state's taxpayers as a result of the crusade is more than $507,000. yearly.



Farmers at Pine Village, Indiana, welcoming the Limestone Special which distributed 33 cars of limestone at one time to the farmers of Fountain and Warren counties.



Left: This man is not attempting to do away with himself. It is Post Office Inspector D. F. Angier, demonstrating a halter-like apparatus which the manufacturer had been selling to gullible "shorties" who long to be longer. The manufacturer no doubt had visions of becoming a financial giant, but a fraud order from the Post Office Department put an end to the business.



Right: Tasting is a method of determining differences that is as old as man, but nevertheless it is used extensively by scientists in the U. S. Department of Agriculture. Here is Dr. W. A. Taylor, chief of the Bureau of Plant Industry, tasting some oranges developed from introduced varieties.

# The Editors Talk

## Fertilizer Prices

Well distributed prosperity for all social groups is pretty largely founded on a right price relationship between a long and varied range of commodity prices. Marked changes in price for any given commodity are usually followed by changes in the relative prosperity of different groups. The farmers, of course, have been the largest group most affected in recent years by adverse price relationships.

A concrete and most instructive instance of this is brought out in the field of fertilizer prices as published in the reports of the Pennsylvania Department of Agriculture. These reports give the selling price per ton of the fertilizers and fertilizer materials collected by the inspectors.

From this data the average retail price of muriate of potash in Pennsylvania, 1910-14, was $45.62 per ton. But for the five years, 1923-27, the average retail price for muriate of potash was higher, namely, $48.01 per ton. At the same time that the retail price was higher, the wholesale price was lower. Why? The reason is quite simple. The costs of distribution from ports and factories to the farmers have increased. Distribution costs are primarily freight rates and wages. Freight rates are practically twice prewar. Weekly earnings of some factory workers for 1923-27 averaged 228 per cent of prewar. During the same period the index number of the cost of distributing food averaged 185 per cent of prewar. The percentage increase in the cost of distributing fertilizers has been about the same as the percentage increase in cost of distributing food. The important and significant point is that high wages have added, not only to the cost of manufacturing and mining fertilizer materials, but also to the cost of distribution to the farmer. The same general trend applies to other fertilizer materials.

Therefore, in territories where the farmer is now paying more for fertilizers than in 1910-14, he is not necessarily paying added profits to manufacturers and mixers, but he is paying for the increases in urban wages and freight rates.

The surprising thing is not that retail prices of fertilizers may have increased a little over prewar; the surprising fact is that the prices are as low as they are.

## Progress in Research

The price of progress is research. The sooner our civilization decides to increase the price, the quicker will be our progress.

Too little credit is accorded research; too little recognition given to the patient worker who obscure in his laboratory gets his life's satisfaction from the service which he is rendering civilization. True, we have our Edison, Marconi, Einstein, and others whose works are watched and heralded on the pinnacles

of fame. But what about the hundreds, sincere and ready to devote their best efforts to countless problems if our civilization will but pay the price of research?

America's phenomenal expansion during the past generation has not been in political influence and power alone. It has included almost every human activity. The many significant discoveries and inventions which have contributed so much to our knowledge and comforts are but the fruits of research.

Through science mankind has been freed from the slavery and drudgery of labor. Every industry should have its highly efficient research organization. Agriculture, that most basic of all industries, has felt the influence of the research mind. The chemist has worked his miracles in this field. Pure food regulations, the recovery of valuable products from waste products of the farm, chemicals for disease and insect control, plant food requirements in our soils, these and a hundred others are the product of his efforts. However, it does not need much thought to realize that the surface has just been scratched and that there are as many more problems challenging the time and effort of inquisitive minds.

The story of science is that of Man ever fighting to conquer Nature. With science Man has a powerful weapon with which to fight. Once a victim of Nature's whims, today he can almost be the master. His success depends upon his knowledge of science and his ability to make practical use of such knowledge. The farmer who makes use of scientific knowledge outsteps the one who does not. But Agriculture needs to catch up and get in step with the other industries.

Progress in research means moving forward—advancement. The problems of keeping pace with the demands of industry demand increased activity in the research field. Only by progress can industry be assured the security of its dividends. Progress we must have or else fall into a state of social, intellectual, political, commercial, and agricultural decay. The power and world influence of nations will surely pass with the passing of national resources, for poverty is helpless and ignorance is the inevitable result of poverty.

The price of progress is research.

## Green Gold

The greatest need of the American livestock farmer is better utilization of his land resources to the ultimate realization of bigger returns for labor and investment.

One step leading to better and more profitable production of livestock is the improvement of our native pastures. Our pasture lands are not adequately fertilized. Our soils have deteriorated and expenditures for feed increased to a point seriously threatening the dairy and livestock industry.

Continuous removal of plant food in meat, milk, and wood has impoverished much of our pasture acreage to the stage of utter starvation. Undesirable grasses, weeds, moss, and brush have taken possession, and pastures once cap-

able of supporting one cow or animal unit per acre, now require anywhere from 5 to 25 acres for each animal unit.

European farmers are far ahead of American farmers in the management and care of the pasture lands. Their success has been due largely to intelligent use of balanced fertilizers. Statistics record that the number of acres required to support one animal unit in the following countries are: Belgium .91, Great Britain and Ireland 2.65, Germany 1.24, Denmark 1.46, and Holland 1.60. What these countries have done certainly should be possible in this country.

There are approximately 231,000,000 acres of humid grassland pastures in the United States, and more than 80,000,000 animal units. These animal units are an economic resource only in so far as they can be efficiently fed.

Green Gold, a film strip issued by the National Fertilizer Association, portrays in a most convincing manner the possibilities for pasture improvement in the New England states. The same fundamental problems exist in other regions. The solution of these pasture problems are vital to the stabilization of the livestock industry and American agriculture. Properly handled, our poverty stricken pastures will turn *Green Gold* into *Real Gold*.

## A National Challenge

No better statement of the obligation of our present generation to the welfare of the generations to follow is to be found than a recent statement by Glenn Frank, President of the University of Wisconsin. We hear a great deal about reforestation and the conservation of our other natural resources; we hear, and that is about as far as the matter goes. President Frank challenges our intelligence and places upon everyone, and especially upon the farmer, an obligation to see that the resources of our American continent which are the basis of our culture, are not exploited to the extent of robbery from the civilization which must follow. President Frank states his challenge as follows:

"One cannot touch even lightly the conservation problem without a sense of coming into the presence of one of the nation's really fundamental problems that touches the lives of all of the people of the State.

"The conservation movement is primarily a symbol of the fact that, in Wisconsin specifically and in the United States generally, we are today in the twilight zone between the exploitation of the American continent and the enrichment of an American culture, using the term culture in a broad sense of the whole fabric and feel of our common life.

"We must, if we are to do more than play at conservation, substitute stable and scientific agriculture for an unintelligent raping and ruining of the soil; we must substitute intelligent forestry for mere timber slashing; we must dress the land that we have deflowered. To date, we have been little more than salesmen of our natural resources; today, we are challenged to become statesmen of our natural resources! This, as I see it, is the real challenge of conservation, and it will involve a sweeping reform of the American mind, as well as reforestation of our denuded areas."

## Speaking of Leaders

Leaders are found and not made, as most successful country agents and extension men have already found. Every county agent who has succeeded has done so largely because he sought the active cooperation of the natural leaders of his county.

Most of the men who have failed when placed in positions of leadership in agriculture have done so because they have felt that their bounden duty was to become the big show. They have not taken into consideration the value of cooperation with the natural leaders in the community.

It is not always easy to discover these forces. They may be uncouth or they may be cultured, old men with a great deal of experience or young men who by pure dint of personal magnetism, physical prowess, or mental keenness have gathered a following. Nevertheless, it is well worth the while of any one who would be an influence in agriculture to seek and become acquainted with these natural leaders.

No paid agriculturist is worth his salary except for his ability to marshal the natural leaders of his section into a tug-of-war team which will pull for those things which mean improvement.

Many a cooperative has failed because the support of the real leaders of the community was not solicited. Many a small local has discontinued operation because more thoroughness was not put into its canvass for membership. It is well then for every leader to remember that the more natural leaders that he can enlist in his cause, the greater will be the chances of its success.

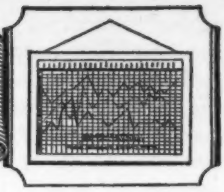
JEFF wants his readers to send him some topics to write about. He hasn't run out of ideas—not by a long shot. He feels, however, that it might be more fun to write something for some one in particular. If you have an idea which you would like to have Jeff discuss, send it along to him, addressed in care of this magazine.

### *HOW BIG IS AN ACRE OF LAND?*

*I ONCE asked an old gardener how much land he had and he said with pride that he had one acre; and he added, "It is a wonderful acre; it reaches to the center of the earth in one direction and it takes in the stars in the other." This man's farm included not only the pot of gold at the end of the rainbow, but it contained the entire rainbow.*

*The size of an acre of land varies directly with the size of the man who manages it. The larger the man, the larger the acre. I do not know that anyone has yet determined how large an acre of land really is; but judging from the size of a plant that a woman grows in a potful of soil, it must exceed all calculations that have yet been made. . . . A man is not the best farmer until his acre grows larger every year, in produce or in serenity or in both.—Dr. Liberty H. Bailey in "The Harvest."*

# AGRICULTURAL DEVELOPMENTS



*By P. M. Farmer*

## HEN HAS SWEET TOOTH

Some experimental work and the experience of poultrymen in Vermont show rather good results from feeding cane molasses to chickens. A. W. Lohman, extension poultry specialist of the University of Vermont, says it makes unfavorable conditions for the development of bacterial troubles in the small intestine. Most of the poultrymen are feeding the molasses in the dry mash, about 4 per cent bringing the best results. Some flock owners are using it in liquid milk with good effect. It can be used with water in making a wet mash. When fed to laying hens it has a tendency to increase egg production and seems to improve the general health and appearance of the flock. The experimental work shows that in all-mash starting and growing rations 5 per cent of cane molasses is best.

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## HUNT FROST-RESISTANT SPUD

Because of frequent losses of potatoes on peat land, which is subject to many summer frosts, vegetable breeders of the University of Minnesota have set about finding or developing a hardy spud that will shake off these light frosts and push on to the production of a profitable yield. It's an important job these plant men have before them, for the State has all of 9,000,000 acres of peat lands, most of them now idle. It is easier to maintain the productivity of peat lands than other lands in the State, and yields in seasons when summer frosts did not get the crop have been two and three times as much as on other soils. About 100,000 potato seedlings are to be tested in cold chambers at the University to see if there are any that will withstand temperatures 4 or 5 degrees colder than present potato varieties will stand.

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## "JUICE" AIDS THE DAIRYMAN

The increasing use of electricity on the dairy farm was emphasized recently by T. E. Hienton of Purdue University in an address to the annual agricultural conference. He listed the following uses: milking cows, separating milk, pumping water, shelling corn, grinding grain, elevating hay, filling the silo, husking, shredding, washing bottles, refrigeration, lighting, heating water, and pasteurization by running a current of electricity through the milk.

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## HIGH YIELDS FROM HYBRID CORN

Ordinary field-selected, open-pollinated seed corn was far behind hybrid seed of inbred strains in producing yields in Iowa last year. This repeats previous results in the state-wide corn yield contest. In the northwest district a hybrid entry yielded 110 bushels to the acre. In the central district of extreme southern Iowa two hybrid entries each produced 120 bushels an acre. The best yield for the open-pollinated corn in the northwest district was 94 bushels, and in the

central district of the extreme south the best this ordinary field selected seed did was 106 bushels. Throughout the 12 districts into which the State was divided, the hybrid seed beat the open-pollinated by from one to ten bushels an acre. In two preceding years about the same results were obtained except in one district.

## SLOW FEATHERERS DON'T GROW FASTER

That slow-feathering Rhode Island Red chickens grow faster than chickens that feather faster has been a popular belief. But the Experiment Station of the University of New Hampshire says this belief is contrary to the fact brought out by a series of tests. The experimenters divided a group of 1,016 fifteen-day chicks into two groups, one of slow featherers and one of rapid featherers. At the end of the test the rapid feathering chicks averaged .2034 of a pound apiece, while the other group averaged .2003 of a pound. When the chicks became pullets and cockerels 65 days old the rapid feathering pullets weighed .36 of a pound more than the slow feathering ones, while the rapid feathering cockerels weighed an average of .20 of a pound less than the slow feathering ones. Similar results were obtained from a second test.

## CROPS DAMAGED BY OILY DUST

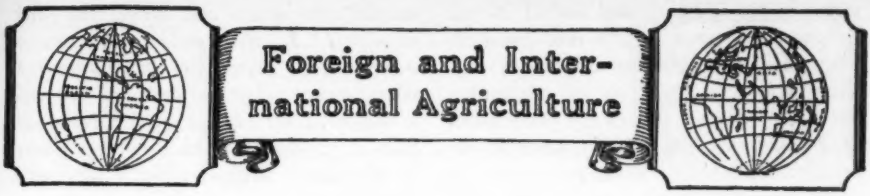
Dust from oiled dirt or gravel roads injures crops near the highway, according to James Johnson, horticulturist at the University of Wisconsin. Tobacco, potatoes, and the common garden crops are easily damaged, while corn and small grains have proved resistant. The bad effect of the oil dust sometimes extends as far as 100 feet from the roadside. Growth of the plants is checked by leaf damage which seems to stop the development of the web while the veins continue to grow and "growth cracks" form. It is thought that some of the damage may be the result of toxicity of the oil. When roads are thoroughly oiled, little dust forms and the damage is not noticeable; skimpy oiling doesn't stop the dust, but merely tinges it with oil.

## COOPERATIVE SPREADS NEW FRUITS

With 1,000 members scattered throughout the world, the New York Fruit Testing Cooperative Association, with headquarters at the Experiment Station at Geneva, performs a service to the horticultural world which the station has not always been in a position to render. It propagates and distributes the new fruits originated at the station and offers membership and service to anyone interested in the propagation of new fruits. The Geneva Station has named 95 new fruits, including 32 apples, 8 pears, 4 plums, 2 cherries, 1 nectarine, 19 grapes, 13 raspberries, 1 gooseberry, and 15 strawberries. Fifty of these new ones are now on the market, and the Testing Association has had much to do with bringing this about. This year the association is offering for sale 70 worthy new fruits.

## LIME-SULPHUR MAKES FATTER CHERRIES

Wisconsin cherry growers have been using Bordeaux mixture to fight leaf spot. Now experimenters at the University of Wisconsin have concluded that in many orchards it will probably pay better to use lime-sulphur. They have shown that usually the cherries are heavier when the latter spray is used and the increased weight is in the flesh and not in the seed. The gains vary with the season and location and growers must try out both sprays.




# Apple Anthracnose

*By E. R. Bewell, B. S. A.*

District Agriculturist, Courtenay, British Columbia

DURING the summer of 1926, I visited several farmers and fruit men in this section of the country in regard to the work being done with fertilizers. One outstanding item of information which I had gathered from horticulturists working in orchards along the Pacific Coast to the south was that by using plenty of potash in an orchard anthracnose of apple trees could be controlled. This was apparently a new idea in the territory which I was visiting, although I was advised that it had been proved 25 years earlier and had been advocated in this section. Apparently, this control measure had been forgotten and pruning and spraying had been the chief method employed in recent years.

I have advocated this old proven method of using potash to build up a hardier and stronger tree that would be resistant to disease, during the past two years, but it was not until the spring of 1928 that I got anybody really interested enough to try it out.

Mr. C. W. Leedam, Courtenay, who is making a specialty of growing flower seeds, bulbs, etc., rented a place close to Courtenay, and asked me to go out to the place and look the trees over. I went and found that I had visited the ranch two years earlier and had advised the owner to apply some potash to the trees. He did not do so, but when I advised Mr. Leedam to apply potash, he told the owner who was still living on the land and he got a 100-pound bag of sulphate of potash and treated all the trees.

When I saw the trees about the end of April, there was one tree in particular that looked as if it were about to die. It was a Yellow Transparent and was out in bloom, and there were no leaves on the tree while all the other trees were in full bloom and out in leaf. The Yellow Transparent looked as if it were nearly dead but was trying to produce another crop before it died. The bark looked dead and was covered with anthracnose cankers with a lot of dead branches in the tree.

### *The Treatment*

The owner of the orchard dug a trench around the trees about five feet from the trunk and put the fertilizer, about five pounds of sulphate of potash, around each tree in the trench, and apparently watered the orchard as he had water laid on. The trees were pruned, taking out dead wood, etc.

I did not see the trees or pay any particular attention to them until Mr. Leedam advised me that the tree so nearly dead, was improving wonderfully and had a crop of apples. I

went to see it again and found it had developed a good hardy leaf growth. The bark was greatly improved and there was quite a crop of apples on the tree. There was every indication that the tree had almost completely recovered.

A recent visit to see the tree disclosed very few signs of any new infection of anthracnose and the old scars were healing over, so it appears that we have got hold of a good idea that will help control this disease which is bad on the Coast of British Columbia. At the same time, I feel that this addition of fertilizer will help produce bigger crops of apples of better quality, also that a fair crop can be produced most every year and a big crop occasionally, instead of a fair crop every other year as under present conditions, and practically no crop in the years between.

To follow up this work, I am carrying on this same work in four orchards, but have had part of the fertilizer applied in the fall so that greater results may be noticed during the coming year. It will take a few years, however, to prove that by using fertilizer, especially sulphate of potash, a bigger crop of better quality fruit can be produced annually, on account of the trees being properly matured, healthy, and more resistant to disease.

I might also add that our Coast soils are mostly very acid on account of a great shortage of limestone. They are also deficient in potash and phosphoric acid, so it is no wonder fruit trees are weak and an easy prey to disease. They come to maturity and into production much earlier than in places where cold winters prevail, on account of the mild winters which greatly lengthen the yearly growing period and practically eliminate a dormant period.

I have often wished that I had taken a photo of the tree so nearly dead last spring, and again with the crop of apples with the tree out in leaf. The contrast was so great that it was almost unbelievable.

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# Profits from Sweets

(*From Page* 24)

There are several factors that influence the production of the type of sweet potato that the market desires. First, they must be free from defects and diseases. The first prerequisite of clean potatoes is to plant only disease-free slips. Only certified slips should be used. Plant them on ground that has not been in sweet potatoes for the past seven or eight years and that does not lie so that water drainage from former potato fields can drain upon it. Even then disease may be in your soil carried there by birds or animals. Second, the potatoes must not be too big in size because the market generally wants a medium potato. Size can usually be controlled by crowding in the row. Usually about 15,000 slips per acre are required, this number giving a slip to every nine or ten inches in the row. Crowding eliminates the jumbos. Third, the physical condition and fertility of the soil have a great deal to do with the production of clean uniform potatoes. Tight clay soil will not permit the production of a sizable smooth potato. Too rich sandy soil will cause large rough potatoes and too thin sandy soil will give a very low yield.

From experiences I have had in past years and from the results of a test plot that I had last year, a reasonably fertile sandy loam or silt loam soil

(*Turn to Page* 49)

# REVIEWS

**This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.**

## Fertilizers

The purpose of standard fertilizer recommendations is to aid farmers in the selection of fertilizers best suited to their needs and to reduce the unit cost by use of high grade fertilizers. In accomplishing this the Fertilizer Inspection Service of the University of Maryland has gone a long way in its Control Service Bulletin No. 130. It represents in a very practical way the demands of the users of fertilizers.

*"Agricultural Liming Materials," State Lime Inspection Service, University of Maryland, College Park, Md., Control Series, No.* 129, *Nov.*, 1928.

*"The Substitution of Stable Manure by Fertilizers, Green Manures and Peat, III," Agr. Exp. Sta., Kingston, R. I., Bul.* 216, *Aug.*, 1928, *Burt L. Hartwell and F. K. Crandall.*

*"The Mineral Content of Feeds, Soils and Waters of South Carolina," Agr. Exp. Sta., Clemson College, S. C., Bul.* 252, *Dec.*, 1928, *J. H. Mitchell, J. D. Warner, and K. S. Morrow.*

*"Pulverizing Limestone on the Farm," Agr. Exp. Sta., Knoxville, Tenn., Cir.* 23, *Dec.*, 1928, *F. D. Jones.*

*"Commercial Fertilizers in* 1927-28 *and Their Uses," Agr. Exp. Sta., College Station, Tex., Bul.* 387, *Oct.*, 1928, *G. S. Fraps and S. E. Asbury.*

*"Experiments with Fertilizers on Rotated and Non-Rotated Crops," Agr. Exp. Sta., College Station, Tex., Bul.* 390, *Dec.*, 1928, *E. B. Reynolds.*

## Soils

*"Terracing Farm Lands," Agr. Ext. Service, Raleigh, N. C., Ext. Cir.* 173, *Dec.*, 1928, *A. T. Holman.*

*"Value of Lime on Cecil Clay Loam Soil," Agr. Exp. Sta., Raleigh, N. C., Bul.* 261, *Nov.*, 1928, *C. B. Williams, S. K. Jackson, F. T. Meacham.*

*"Value of Lime on Norfolk Sandy Loam Soil," Agr. Exp. Sta., Raleigh, N. C., Bul.* 262, *Nov.*, 1928, *C. B. Williams, H. B. Mann, R. E. Currin, Jr.*

## Crops

Looking through the new bulletins on crops for special mention of fertilizer practices for this issue, we find that William Stuart of the United States Department of Agriculture, in an article on cutting the cost of potato production, appearing in the January number of the American Potato Journal, has this to say: "But the best prepared seed bed will not give high yields unless the soil has sufficient available plant food. Barnyard manure will supply a portion of this plant food. However, barnyard manure is an unbalanced plant food. It is too high in nitrogen and too low in phosphorus and potash. The best practice usually is to plow under eight to ten tons of manure per acre and to apply a commercial fertilizer rich in phosphorus and potash. The amount to use must be governed by the natural fertility of your soil."

Farmers in the South planning to grow some soybeans and wondering about fertilization of this crop will find information in the revised Extension Circular 127 of the North Carolina State College of Agriculture and Engineering. The title of the bulletin is "Soybean Growing in North Carolina." Outside of its fertilizer recommendations, the bulletin contains a comprehensive treatment of the other

problems incident to success with this legume crop which is growing more and more popular.

The new Annual Report of the Director of the Wisconsin Agricultural Experiment Station, Wisconsin bulletin 405, "What's New in Farm Science," points out that potash and phosphate fertilizer added to fields sown to alfalfa greatly increased the ability of the alfalfa to withstand winter-killing. The result of many of the experiments in Wisconsin will be welcomed by farmers in localities where severe winters test the hardiness of farm crops.

Other new crop bulletins of the month include:

*"Cotton Spacing—I. Studies of the Effect on Yield and Earliness," Agr. Exp. Sta., Fayetteville, Ark., Bul. 230, Jan., 1929, J. O. Ware.*

*"Linkage Studies in Barley," Agr. Exp. Sta., Fort Collins, Colo., D. W. Robertson.*

*"Annual Report of the Director," Agr. Exp. Sta., Newark, Del., Bul. 158, Nov., 1928, C. A. McCue.*

*"Pumpkins and Squashes," Mass. Agr. Col., Amherst, Mass., Ext. Leaflet 101, Dec., 1928, Paul W. Dempsey.*

*"Environmental Factors Influencing Wheat Production in Maryland," Agr. Exp. Sta., College Park, Md., Bul. 297, July, 1928, W. B. Kemp and J. E. Metzger.*

*"On the Corn Frontier," Agr. Exp. Sta., Crookston, Minn., Spec. Bul. 120, June, 1928, R. S. Dunham.*

*"Experiments with Sugar Beets," Agr. Exp. Sta., Bozeman, Mont., Bul. 215, July, 1928, D. A. Savage and LeRoy Powers.*

*"Some Outstanding Accomplishments of the Montana Agricultural Experiment Station," (34th Annual Report), Bozeman, Mont., F. B. Linfield.*

*"Systems of Livestock Farming for the Mountain Region of North Carolina," Agr. Exp. Sta., Raleigh, N. C., Bul. 260, Oct., 1928, R. J. Saville.*

*"Available Publications," Agr. Exp. Sta., Fargo, N. D., Cir. 85, Jan., 1929, F. F. Monroe.*

*"Alfalfa," Agr. Ext. Div., Fargo, N. D., Cir. 86, Jan., 1929, E. G. Booth.*

*"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XIV, No. 1, Jan.-Feb., 1929, Whole No. 136, F. A. Welton and V. H. Morris.*

*"Director's Biennial Report — 1924-26," Agr. Exp. Sta., Corvallis, Ore., J. T. Jardine.*

*"Annual Report of the Western Washington Experiment Station, Exp. Sta., Puyallup, Wash., No. 10-W, New Series, Oct., 1928.*

*"Blueberry Growing—A New Industry in Washington," Agr. Exp. Sta., Pullman, Wash., Pop. Bul. 144, Dec., 1928, D. J. Crowley.*

*"Thirty-Eighth Annual Report," Agr. Exp. Sta., Pullman, Wash., Bul. 229, Dec., 1928, Edw. C. Johnson.*

*"Tobacco Plant Beds," State Col. of Agr. and Eng., Raleigh, N. C., Revised Ext. Folder No. 8, Jan., 1929, E. Y. Floyd, E. G. Moss, and James F. Bullock.*

## Economics

In Colorado Bulletin 346, "Some Colorado Tax Problems," by L. A. Moorhouse and Burton D. Seeley, in cooperation with Whitney Coombs of the United States Department of Agriculture, a study has been made of the tax system of Colorado with special reference to agriculture. Among the interesting findings it is pointed out that in 1918 the general property taxes on ranch farms were 22.7 per cent of the net rent. For the two years 1925 and 1926, the tax averaged about 33 per cent of the net rent.

The increase in the price of apples from 1896 to 1910 stimulated apple production in the United States. The expansion was rapid in the West and many trees were planted. Since the plantings of this period have come into bearing, the apple industry has not been as prosperous. These are some of the facts pointed out in Bulletin 208, "An Economic Study of the Apple Industry of Utah, 1926 and 1927," by W. Preston Thomas and P. V. Cardon. The authors believe that probably the peak of production has about been reached and the future trend will be somewhat downward.

## Diseases

*"Vascular Structure and Plugging of Alfalfa Roots," Agr. Exp. Sta., Fort Collins, Colo., Bul. 339, Oct., 1928, E. L. LeClerg and L. W. Durrell.*

*"Seed Treatment of Irish Potatoes," Agr. Ext. Service, Raleigh, N. C., Ext. Cir. 172, Jan., 1929, G. W. Fant.*

*"Spraying Experiments with Bush Lima Beans," Agr. Exp. Sta., Geneva, N. Y., Bul. 558, Nov., 1928, E. E. Clayton.*

*"Cotton Diseases of Special Importance in Tennessee, and Their Control," Agr. Exp. Sta., Knoxville, Tenn., Cir. 24, Jan., 1929, C. D. Sherbakoff.*

**Insects**

*"The Fruit Tree Leaf Roller in Western New York," Agr. Exp. Sta., Geneva, N. Y., Bul. 561, Dec., 1928, S. W. Harman.*

*"The Bagworms of Texas," Agr. Exp. Sta., College Station, Tex., Bul. 382, July, 1928, Frank Morton Jones and Harris Braley Parks.*

# Corn Chlorosis

(*From Page 27*)

has been shown to intensify the symptoms of magnesia hunger on tobacco. Thus the response to the lime treatment indicates that the chlorosis was due to a lack of magnesia.

On the unlimed area there has also been an increase in the proportion of chlorotic hills, but not as marked on the limed area. The percentage of chlorotic hills, however, has always been many times higher and the chlorosis of a much more extreme type.

The observation on the magnesium sulphate plots has been exactly the reverse of that for the limed and unlimed plots. The chlorosis has been getting less each year. In 1928 only 2 per cent of the hills were affected as contrasted with 23 per cent in 1924. The magnesium sulphate, at rates of 200 pounds per acre in 1924 and 1927 and 400 pounds in 1928, was applied in the spring in each instance, within about 10 days of the time of planting the corn. It decreased the chlorosis about 43 per cent in 1924, 70 per cent in 1927, and 88 per cent in 1928. Lime, on the other hand, decreased the chlorosis for the same years by about 64, 76, and 73 per cent respectively. Where magnesium sulphate was used in addition to the lime, the chlorotic hills remained about constant for the three years, averaging about 2.6 per cent.

The effect the chlorosis had on yield is shown in table 2. Considering the average, it is apparent that the yield of corn where magnesia was added either in lime or in magnesium sulphate was increased about 16 to 23 per cent over that on the unlimed area receiving no magnesia.

The yields of corn on the limed and magnesium sulphate plots were very close. The stover yields on the contrary do not show a very great difference between the plots receiving and those not receiving magnesia. The low yield in grain was associated with the high proportion of chlorotic hills.

The work in the greenhouse was designed to clarify that done in the field by answering the following questions:

1. Was the capacity of the lime to counteract aluminum injury in any way responsible for its ability to over-

Table 2.—Relation of the Chlorosis to the Yield per Acre of Corn and Stover.

| Treatment | 1924 | | 1927 | | 1928 | | Average | | Chlorotic hills |
|---|---|---|---|---|---|---|---|---|---|
| | Corn | Stover | Corn | Stover | Corn | Stover | Corn | Stover | |
| | Bu. | Lbs. | Bu. | Lbs. | Bu. | Lbs. | Bu. | Lbs. | Per cent |
| Limed | 33.5 | 1864 | 38.5 | 1901 | 37.0 | 2112 | 36.3 | 1959 | 7.60 |
| Unlimed | 27.2 | 1749 | 36.4 | 1820 | 25.0 | 1676 | 29.5 | 1748 | 78.54 |
| Magnesium sulphate | 31.4 | 1826 | 39.6 | 1980 | 31.4 | 1828 | 34.1 | 1878 | 11.92 |
| Limed + magnesium sulphate | 33.9 | 1945 | 37.7 | 1785 | 32.5 | 1879 | 34.7 | 1870 | 2.57 |

come the chlorosis?

2. Was it the magnesium in the lime that counteracted the chlorosis?

In answering the first question, soil was taken from the chlorotic area of the field and treated in pots in the greenhouse with chemically pure lime and high applications of superphosphates. In the amounts used, both the lime and superphosphate have antidotal effects on aluminum toxicity. But when corn was planted, just as much chlorosis developed as in the pots where neither of these corrective treatments was applied. A determination of pH was made on the soil and found to be about 5.3. Soil with such a degree of acidity, according to the reports of other workers, would not likely contain enough active aluminum to injure corn, a plant naturally very resistant to this toxin.

Further evidence was secured by growing lettuce on soil from the chlorotic and non-chlorotic areas of the field. The lettuce grew equally well on both of these soils. Lettuce is rated as an aluminum sensitive crop and if aluminum were associated in any way with the chlorosis, the soil from the chlorotic area should have shown poorer growth. This, together with the fact that aluminum antidotes had no influence on the chlorosis lead to the conclusion that aluminum was not a factor in causing the chlorosis.

In answering the second question, the pots to which the chemically pure lime was applied were compared with those receiving magnesium sulphate, agricultural lime, and the check. The magnesium sulphate completely overcame the chlorosis; the agricultural lime did almost as well; but the chemically pure lime had no effect, the chlorosis on the pots where it was used being just as extreme as on the check.

In checking further on the aluminum and magnesia hypotheses, determinations of aluminum and magnesia were made on chlorotic and normal plants. Of the several determinations made, no significant difference could be detected in the aluminum content of the chlorotic and normal plants. In some instances there was actually more aluminum in the normal than in the chlorotic plant. The magnesia on the other hand was always higher in the normal plants. The MgO content of the normal leaves ran around .33 per cent while that for the chlorotic leaves was .11 per cent, about three times as great.

Thus the work of the field, greenhouse, and laboratory all fit together in showing: (1) that aluminum toxicity was not the cause of the chlorosis; (2) that the soil through long continued use of fertilizers free of magnesia has become deficient in this important plant nutrient; (3) that furnishing magnesia either in lime or magnesium sulphate counteracted the chlorosis; and (4) among its other uses lime has also the important role of improving crop growth by furnishing magnesia.

### *Sulphate of Potash Magnesia*

Although recognized chiefly as a source of potash, sulphate of potash magnesia is also considered a practical means of supplying magnesia on soils deficient in this nutrient. It is now being used successfully for tobacco in the Connecticut Valley in the dual capacity of furnishing some of the potash and much of the magnesia required to prevent sand drown. While not used in the experiments reported above, the experience with sulphate of potash magnesia in controlling sand drown of tobacco is good evidence that when used in the proper amounts it will prevent the chlorosis on corn. For the average soil deficient in magnesia it has been estimated that applications of 20 to 24 pounds per acre of magnesium (Mg) or 30 to 40 pounds per acre of magnesia (MgO) are sufficient to prevent magnesia hunger on either tobacco or corn.

# Profits from Sweets

(*From Page* 44)

should be selected and then that soil balanced in plant food by a liberal use of commercial fertilizer.

Since it is the number of U. S. No. 1's that count, any increase in yield without a corresponding increase in the percentage of No. 1's will not suffice. The figures of the test presented here are to determine what value, if any, the addition of a liberal application of potash had with reference to the percentage of U. S. No. 1's. Three plots were used for the test. One was left as a check without any fertilizer, the other two plots received each an application of 1,000 pounds of a 12-4-4 fertilizer, with one of the fertilized plots getting an additional application of 200 pounds of muriate of potash per acre.

The unfertilized acre produced a total of 183 bushels of which 73 bushels were U. S. No. 1's, slightly less than 40 per cent of the total. The acre with the 1,000 pounds of 12-4-4 gave a total yield of 250 bushels of which 100 bushels or 40 per cent were U. S. No. 1's. The acre which received in addition to the 1,000 pounds of 12-4-4 the 200 pounds of muriate of potash produced a total yield of 270 bushels with 150 bushels or 55 per cent U. S. No. 1's.

The potatoes in this plot went through a severe drouth lasting from June 24 until August 18 and, no doubt, the percentage of No. 1's in all of the plots was cut down.

One thing was very striking in the fertilized plots and that was that the No. 1's ran well to a uniform size and were comparatively free from blemishes and deformities. In the acre that received the additional 200 pounds of muriate, there was not a single jumbo nor a deformity that the strictest grader would not pass as a No. 1. One noticeable thing in favor of the potash was that there was not the slightest trace of any skin disease on the potatoes.

On another acre plot of potatoes, not in connection with this test I gathered a total of 276 bushels of which 46 per cent were No. 1's. This acre received no fertilizer of any kind but while the yield was satisfactory and the percentage of No. 1's good the size and shape of the potatoes were not all uniform.

My conclusions are that the liberal application of fertilizer and especially the additional application of potash will pay for itself in quality of potatoes alone to say nothing about the increase in production as a whole.

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# Record Tomatoes

(*From Page* 29)

400 pounds nitrate of soda, 500 pounds superphosphate, and 150 pounds of muriate of potash.

Experimental work and farm practices have shown conclusively that quality tomatoes can be grown only when sufficient potash is present as lacking potash the tomatoes "puff," large splits occur, the flesh is not as firm, and yields are not large. Nitrogen and phosphorus are needed, but too much nitrogen causes a large amount of leaf or plant growth with consequent decrease in fruit production.

Tomato growers have been using a commercial mixture analyzing 4 per cent of nitrogen, 8 per cent of phosphorus, and 4 per cent potash. Re-

sults have shown that this is an unbalanced mixture and that the potash should be increased for best results both as to yield and quality.

Canning tests during the season of 1928 by the J. H. Dulany and Sons Packing Company at Fruitland, Maryland, showed that a mixture containing 20 per cent potash packed out many more No. 3 cans than where less potash was used. For example, based on a 300-basket yield per acre, the 20 per cent mixture would pack out and did pack out 400 more cans, per acre, than did a mixture containing 10 per cent potash. At the prevailing prices this represented a bonus of $60 per acre from improvement in pack due to the increased potash. The cost of the extra potash was paid by increased yield.

Realizing the need of potash for tomatoes, the Smiths used a 4-8-10 mixture on their 10-acre field. That their belief was correct is shown by the yield obtained and also by the quality of the fruit as delivered to the canning house. The plants made sufficient growth, showing that they had received enough nitrogen, and the set of fruit, especially the crown set which is so important, was large enough to justify more potash.

The total production of this 10-acre field will be interesting as it illustrates what can be done on a small acreage.

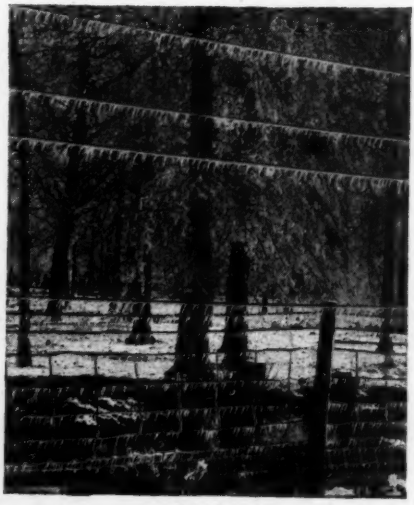
As stated beans occupied the ground during the early part of the season and they yielded 2,590 hampers or an average yield of about 250 hampers per acre. At $1.50 per hamper, which is far from being a high price, this crop would have returned $3,885 gross.

The tomato crop was not all sold to the canning house, but some of it was shipped to market in 12-quart crates and 36-quart crates. Needless to say, these choice fruits brought more than canning house prices, yet basing the tomato crop on canning house prices, which were 25 cents per basket, the total returns from tomatoes grown on these 10 acres would reach $1,288.50, or a grand total of $5,173.50 from 10 acres.

An average of $500 per acre surely justifies the use of fertilizer, companion cropping, and careful tillage.

It is interesting to see just what fertilizer this piece of land received during the season. The three applications totalled 1,800 pounds containing 90 pounds of nitrogen (actual), 132 pounds of phosphorus, and 126 pounds of potash. This would be equivalent to 600 pounds nitrate of soda, 825 pounds of superphosphate, and 252 pounds of muriate of potash.

Looking at the problem in another way the plant food applied during the season would analyze based on ton practically 4 per cent nitrogen, 6 per cent phosphorus and 6 per cent potash. This is approaching what some folks consider the ideal ratio, a 1-1-1, but needless to say that a 1-1-1 ratio will not answer for all crops, at least so far as present information and knowledge is concerned. However the ratio above shows the trend towards increasing the potash so that it equals at least the percentage of phosphorus contained in commercial fertilizers.



March

## Pages From A Field Note Book

# Fertilizers *on a* Stock Farm

*By E. E. Reynolds*

Washington, D. C.

THE opinion still prevails that commercial fertilizers have no place on stock farms where large quantities of stable manure are produced. My experience, however, leads to the conclusion that where commercial fertilizers are used as a supplement to manure, with a full understanding of soil and crop requirements, they will return highly satisfactory dividends on the investment. In fact, with most livestock manures, two elements most economically supplied by commercial fertilizers, potash and phosphorus, are absolutely essential to make a well balanced plant food.

A number of years ago I had the supervision of a 300-acre horse farm. The stock consisted of 125 to 140 horses, seven or eight cows, and from 300 to 600 fowls. Large quantities of feed were purchased in addition to the hay, grain, and root crops produced on the farm.

The manure from this stock was hauled out onto the farm, being largely used on the plowed land. The owner, a city man, held to the then popular belief that with such an abundance of stable manure there was no necessity for buying commercial fertilizer. But the results proved conclusively that heavy applications of manure do not solve the farmer's soil fertility and crop production problems.

On the Dunkirk fine sand, the prevailing soil type, the oats and hay, which were the two principal crops, made a rank growth in favorable seasons, but lodged badly. They gave trouble in cutting, and much grain, straw, and hay was of poor quality. The corn, whether for silo or husking, lacked substance, and yields of root crops were disappointing.

After some persuasion the owner of the farm gave his permission for the purchase of enough commercial fertilizer of about an 0-12-6 analysis to cover a 20-acre oat field at the rate of 350 pounds to the acre.

A good implement for the even application of commercial fertilizer.

The results were so convincing that thereafter the use of commercial phosphate and potash as a supplement to the stable manure became the regular farm practice. There was little lodging of grain or hay, and the yields of hay, grain, and straw were largely increased, with a decided improvement in quality. The paddock, pastures, and old alfalfa fields were rejuvenated and brought into productiveness, and the feed bills were cut far below the cost of the chemical fertilizers.

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# Agriculture Today

(*From Page* 23)

purposes, good burning qualities are essential, and, other things being equal, the combustibility of the leaf is more or less proportional to its content of potash. In this respect the form of potash used in the fertilizer is of considerable importance. The chlorine contained in muriate of potash under some conditions tends to stimulate the growth of tobacco, but if present in large proportions it injures the burning qualities of the cured leaf and may even produce injury in the field.

"The quantity of the potash in the fertilizer required for best results will vary, of course, with the type of soil, the system of cropping followed, and other factors. For average conditions on most of the light tobacco lands, and with normal rates of fertilizing, however, better results probably will be obtained with a minimum of 40 to 60 pounds of potash per acre than with the lower rates now commonly used. It appears that in most cases the potash content of the fertilizer should exceed the content of ammonia by two or more units."

The growing appreciation of the essential nature of fertilizers in agriculture, as agents for conserving soil fertility and increasing farm profits by effecting the reduction of acreage cultivated and the increase of yields per acre and per man power, demands an increasing fund of fundamental data regarding the properties of soils and fertilizers. Accordingly, the Federal department is conducting research on the chemical and physical properties of the newer fertilizer materials, their interaction in mixtures, behavior in storage, and their suitability for use in fertilizer drills. The aim is to discover and overcome the practical difficulties involved in the production and use of concentrated fertilizers, which are now rapidly replacing the lower grade mixtures formerly used.

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# Oats

(*From Page* 13)

of the world acreage. Russia is second and Canada ranks third. In the Corn Belt, where the bulk of the crop is grown, it is spring sown and fits into the rotations unusually well. Most commonly it is planted after corn. Because of its hardiness, it thrives on a wide range of soils, and while the densest acreage is found in the Corn Belt, it is grown to some extent in all states. The southeastern states and a narrow strip along the

Pacific Coast have winter sown varieties. Yields are best in the spring sown areas, particularly in the northern areas of the main belt.

In the United Kingdom 24 per cent of the cropped land has been devoted to oats, and in Sweden 23 per cent. Its unusual adaptability to a wide range of soil conditions makes it a favorable grain in regions of poor soils or very cool climates. In Sweden the crop is said to be grown almost up to the Arctic Circle.

In the United States oats ranks third in acreage, corn being first and wheat second. In 1927, 42,227,000 acres were grown, about a third of the world total. Its distribution in America is not greatly unlike that of corn, the bulk of the production being in the Upper Mississippi Valley, where the crop seems to find very favorable conditions. Its denser acreage area, however, extends somewhat farther northward than does the Corn Belt proper.

Its popularity in the Corn Belt is due not only to the productiveness of the crop in this region but also to the ideal manner in which it fits into the rotation with corn. Spring wheat does not thrive very well in this section, and winter wheat needs to be sown before the corn can readily be removed from the land. A spring sown grain, therefore, is most satisfactory to follow corn in the rotation and the oat crop fits this requirement well.

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# Iowa

(*From Page* 11)

experimental orchard was set out. Since that time horticultural investigation, especially with apples, has been an important part of the work of the station. The chief purpose of these investigations has been to produce varieties of apples adapted to Iowa conditions of climate and soil. Under S. A. Beach, vice-dean of agriculture and chief of the horticultural section from 1905 to 1922, considerable progress was made. Since the

Looking across the plots at the Iowa agronomy farm.

death of Dean Beach the section has announced a number of named varieties, which have met with considerable favor.

Recently some very important work has been done by the plant pathology section in the development and testing of disease treatments for seed. Increased corn yields of about five bushels to the acre have been secured by the use of the dust treatments recommended by the station.

A visit to the station agronomy farm in the summer or fall is highly interesting. It lies on rather level ground, its test plots forming a checker board of yellow and green. Some 40 of the 200 acres are devoted to soils experimentation. Here various kinds and combinations of fertilizers are compared with untreated plots. One important piece of investigation is with crop rotations. Certain crops have been grown here with long and short rotations for a period of 10 years. It has been demonstrated that a three-year rotation of corn, oats and clover yields much greater economic returns than a two-year alternation of corn and oats. This was found true on both the treated and untreated plots. Four and five-year rotations, likewise, showed generally better results than the three-year.

Across the road from the soil plots are the crops experiment fields. Here have been bred several very valuable strains of oats. More recently the station has developed and distributed a new variety of winter wheat which has shown up very well in yield tests.

Perhaps as important to Iowa as any other work with which the crops section has had to do is the locating of high-yielding strains of corn, including the new hybrid strains. Each year several hundred samples of corn are tested on 12 testing fields located in different parts of the state. The planting and harvesting of the corn are supervised, although the plots are located upon the land of cooperating farmers. The yields of all of the samples are ascertained and the results announced each year at the time of the college's Farm and Home week. The beneficial results of this test are especially evident in northern Iowa where outstanding strains of yellow corn have been found.

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# The South's Convention

(*From Page* 30)

9. Produce all the food required for the men and animals on the farm.

10. Keep an account with each farm product, in order to know from which the gain or loss arises.

Other Knapp epigrams which one heard repeated around the Convention included: "It is impossible to impress upon anyone that there is dignity in residing on a farm with impoverished soil, dilapidated buildings, and an environment of ignorance." "The income of the farm can be increased from three to five-fold by the use of improved methods." "Double the crop to the acre and halve the cost." "The basis of the better rural life is greater earning capacity of the farmer." "The least worthy monument to a man is a granite block or a marble shaft. They represent the dead man's money and the kindness of friends. The true monument is what the man has accomplished in life. It may be a better gate, or house, or farm, or factory—put his name on it and let it stand for him."

There were too many important side meetings, banquets, and addresses at the general sessions to accurately report here; and there were many views on the present agricultural situation. L. W. Baldwin, President of the Missouri-Pacific Railway Com-

pany, believed that since the greatest problem of the farmer is the marketing of what he produces, the answer to this problem will be found in widespread education and an intelligent administration of the natural law of supply and demand, rather than in any effort to repeal that law or obtain relief through the use of some temporary stimulant.

C. A. Cobb, Editor of the *Southern Ruralist*, stated that though there are some who are apparently bewildered at the agricultural unrest of the present, there is nothing strange at all about it. It simply means that intelligence in agriculture has arrived at a period where it is able to think clearly and that seeing clearly, it is not afraid to strike and strike hard at the shackles which have bound the industry down so long.

E. C. Brooks, President of the North Carolina State College of Agriculture compared agricultural distress—famine with agricultural distress — overproduction, and said that the farmer is still hugging to himself the delusion that some day he, unaided by merchants, bankers, and other business men, may be able to control his products. They are controlled by the flow of money to the consumers and this flow is governed to a degree by all classes of producers and consumers. Therefore, it is absolutely essential that the farmer cooperate freely and intimately with other producers and other business men.

John Fields, Vice-President of the Federal Land Bank at Wichita, Kansas, cited two conclusions of Dr. Seaman A. Knapp—first, that most failures in farming are on the business side and not on the scientific side; second, that a large proportion of the vast wealth created annually from the soil ultimately enriches the city instead of improving and developing the resources of the country. He came to the conclusion that if every farm family throughout the United States would spend less than its income in 1929, its relative position would improve many times more than it will be benefitted by whatever legislation is likely to be enacted. In other words, keep the income ahead of the outgo.

R. R. Moton, President of Tuskegee Normal and Industrial Institute, whose audience was made up of fully one-fourth negroes, said that there could be no successful solution of the Southern farm problem unless such a plan included the development of the negro farmer to his utmost usefulness through education. Keeping his audience well amused with anecdotes and such sallies as—negroes not only excel in the death rate and in spending money, but they can always beat white folks in singing negro songs, Dr. Moton also introduced the serious thought that the solution of the racial problem can and will be most successfully worked out below the Mason-Dixon line.

There were many other important and prominent speakers.

### *The Agronomy Meeting*

Of especial interest to the agronomic field was the meeting of the agronomy group at which J. F. Duggar of Alabama Polytechnic Institute discussed the development of agronomic work in the South. He divided southern agriculture into six periods—First, the slavery period in which brawn not brain, determined our agricultural destiny. The second period, extending from the close of the Civil War to the establishment in 1888 of the American system of agricultural experiment station, he termed the preparation period. This period was notable for the introduction and adoption of the tenant system. He then carried his review on through the years in which extension work and the influence of agricultural colleges developed, and state universities played such an important part in building up the present agriculture of the South,

through the violent fluctuations in prosperity since 1920, to our current period in which research and the activities of agronomists working in behalf of the farmer are recognized as so vitally important.

After the convention about 350 of the attendants took advantage of an educational trip South in the state to Edinburg, where they were met by automobiles and taken through the lower Rio Grande valley. Citrus groves and truck farms, beautiful semi-tropical homes, and most genial hospitality on the part of the residents of the valley were features of the trip. The day closed with a short trip into Mexico and a wild game dinner at Matamoras at which Marte R. Gomez, Mexican Secretary of Agriculture, welcomed the visitors and told them something of the extension work in agriculture which is being done in Mexico.

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# Farming Without Manures

(*From Page* 28)

the first crop. This was plowed down early and a crop of rye followed. The rye was wintered over and in the spring of the second year, it was plowed down. A small amount of fertilizer and a crop of soybeans were sown in the spring of the year. This in turn was plowed down and barley and oats followed. These were plowed down and rye followed planted very late for a winter-cover crop. This rye was plowed down in the spring of the third year and a wide variety of miscellaneous vegetable crops was planted on this soil. Previous to the planting the soil was again tested for lime needs according to the crop to be planted, and the soil condition was corrected by applications of lime.

During these two years of soil improvement, each crop grew better than the preceding one. These crops were just the thing needed for the soil. The frequent plowing and working of the soil also were highly beneficial.

Mr. Peckham did not look for exactly bright results the third year with his miscellaneous vegetable crops but he did plant beets, carrots, parsnips, lettuce, spinach, celery, beans, cabbage, endive, tomatoes, peppers, sweet corn, and a few others. All of the 24 acres were covered with vegetable crops. Of course heavy applications of fertilizer were used. Mr. Peckham favors the 5-8-7, although he did use some other fertilizers. At least a ton per acre was used on almost all of these crops, and 3,000 lbs. or slightly more, were used on celery.

Mr. Peckham is a careful gardener and gives good care throughout the season. He was greatly pleased by the crops harvested. In every instance they were equal to any crops that he had ever grown. They showed no ill effects from the lack of stable manures. They were of as large size, of as good color, of as good quality and all other characteristics as any similar varieties grown elsewhere.

In the fall, as the crops were harvested, rye was sown on the ground. The sowing of rye in the fall has become an annual practice. This rye is not plowed down in the spring when it is small, because Mr. Peckham uses this land for late crops more than early crops. He has waited each year after the third until the rye is at least as tall as a man. It is then plowed down. When criticised for allowing the rye to grow so tall, Mr. Peckham's answer has always been: "I agree with you, perhaps I do not

get my greatest benefit from the rye in the year when it is plowed down, But I do get all the advantages of the rye in the next year or two thereafter."

It is now almost seven years since this work was started, five years of intense vegetable cropping, and I can state very honestly that just as good crops are now being grown as were grown at first. I see no reason why they cannot continue to be grown on this farm by the practice followed by Mr. Peckham, that is, a cover crop for soil improvement purposes and heavy applications of commercial fertilizer balanced properly by liming as needed by the individual crop.

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# Top-Dressing Cotton

(*From Page* 16)

Such results are contrary to the general belief that little potash is needed on clay soils. They give further support to the statement that previous methods of fertilizing and cropping of a soil seem to exert as much influence upon the response of a particular crop to potash as does the soil type itself.

### *A Better Ratio of Lint*

As to the beneficial effects of potash top-dressing on the cotton plant the farmers conducting the demonstrations found that the top-dressed cotton produced healthy, sturdy plants which put on squares very early. These plants set more squares for larger yields, and their shedding was reduced to a minimum. Their bolls were bigger and the cotton was easier to pick. The extra potash absolutely controlled rust and helped control wilt.

By ginning the cotton from their plots separately some farmers discovered that the extra potash increased the ratio of lint to seed. A typical case is that of J. W. Baxter, manager of the Kildare Farms at Huntsville, Ala. On one plot, fertilized with 600 pounds of 15-5-5 and 100 pounds of nitrate of soda per acre, he produced 1,500 pounds of seed cotton. The same yield was produced on another plot receiving the same fertilizer treatment plus a top-dressing of 50 pounds of muriate of potash. The 1,500 pounds of seed cotton, without the extra potash, ginned out 454.4 pounds of lint, while the 1,500 pounds that got the extra potash ginned 490 pounds of lint from 1,350 gain of 20.6 pounds.

N. S. Wolfe of Mt. Olive, N. C. ginned 490 pounds of lint from 1350 pounds of seed cotton which had been fertilized at the rate of 600 pounds of 8-3-3 and 100 pounds of nitrate of soda per acre. The same amount of seed cotton fertilized the same way but top-dressed with 100 pounds of muriate per acre produced 530 pounds of lint, or a gain of 40 pounds.

Mr. Wolfe had 20 acres of cotton in each plot. If both plots had produced at the rate of 984 pounds per acre with no gain in yield for extra potash, the difference in the amount of lint for the 20 acres would have been 584 pounds. At 18c per pound this is $105.12. The extra potash for the 20 acres cost less than $50.

### *Extra Potash at Planting*

In view of the fact that the top-dressing demonstrations were concentrated mainly in the Southeast, a series of 30 demonstrations were placed in Tennessee, Arkansas, Mississippi, Louisiana, and Texas, in which varying amounts of potash were used under cotton at planting time. In each demonstration were three plots: plot

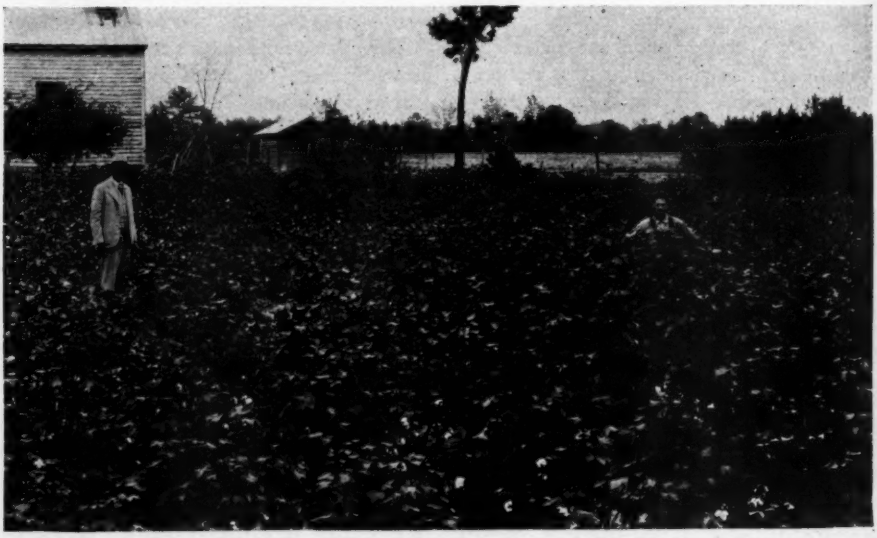
Farmers visiting the Taylor Farms (2,000 acres of cotton) at Summerville, Ga. One acre fertilized with 800 pounds of 12-4-4 and 100 pounds of nitrate of soda per acre produced 1,076 pounds of seed cotton. Another acre with the same fertilizer and 128 pounds of muriate of potash top-dressing produced 1,746 pounds.

1 in each case received 600 pounds of 8-6-0 per acre; plot 2 received a like amount of 8-6-4; and plot 3, the same amount of 8-6-8. The average yields for the 30 demonstrations were:

| FERTILIZER PER ACRE | SEED COTTON PER ACRE |
|---|---|
| 600 pounds 8-6-0 | 850 pounds |
| 600 pounds 8-6-4 | 990 pounds |
| 600 pounds 8-6-8 | 1,092 pounds |

These results run counter to the belief held by many southwestern farmers that relatively large amounts of fertilizers will not pay under average conditions. Note that the variation in actual potash per acre was 24 pounds. This is more potash per acre than is used by most southeastern farmers.

Wherever extra potash is used in large amounts it seems to disrupt a few long accepted theories of fertilizing cotton. And it does this with the unanswerable argument of extra cash produced by extra yields and extra quality.



A top-dressing of 100 pounds of muriate of potash per acre returned Mr. J. E. Ross of Durham, N. C., $33.60.

# Better Pastures

(*From Page 7*)

nitrate nitrogen is most desirable because of the physiological relationships and that for the hard grasses like redtop and bent-grasses ammonia nitrogen is desirable. He likewise states that the so-called soft pasture plants require an abundance of such elements as potash, calcium, and phosphorus. This is borne out by Haskell's findings in rejuvenating old pastures with fertilizer applications and by White in his work with bluegrass pastures. Haskell obtained the greatest increase in dry matter and protein content from an application of phosphorus, potash, and lime and attributes to it the remarkable increase in white clover. White obtained the greatest computed acre value from applications of calcium, phosphorus, potash, and nitrogen. Sprague also obtained the highest number of feed units on pastures where lime, manure, or commercial fertilizers were used.

Full nutritive value cannot be realized in pastures unless there is plenty of succulent grass with a high protein and mineral content and where feasible it is best to produce it by fertilizer applications rather than by the use of mineral supplements in the feeding ration.

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# Organization

(*From Page 4*)

tary orders and tribunals, the usage of warfare and the rigorous discipline of armed camps. It finds echo in the galley slaves toiling for the Corsairs and the Volga boatmen trudging on their leaden pathway. Gradually the stern habits of militarism and slavery expanded to industrial centers in the Middle Ages, first with the Hanseatic League and then with the trade guilds and the apprentice era, haunted with dark Hogarth reminders.

Then in the American Colonies came the Whigs and Tories followed by the Mugwumps and Free Soilers. But after the Civil War the returning soldiers, because of a surfeit of dismal drill masters, inoculated the nation with a spirit averse to organization. For a decade or two afterward the chief allegiance was to the lamp-lit conclaves of the Masons, Odd Fellows, and the Good Templars. The West had to be conquered and plowed which was a job for lonely, self-reliant pioneers.

To be sure, there were "organized sports" and "standardized play" among our settlements. However, they went by other names. Somehow, they managed to enjoy themselves without the direction of the rural sociologists who now interfere with our foolish hours of idleness and try to make our festivals "community conscious" or something equally pedantic.

Even in my time there lived a fractious fiddler by the firelight whose lively right arm in a ragged calico shirt sleeve made jumping shadows that fluttered on the wall to the rhythm of his squeaky music. Little did he know about the wave of reformation that would soon replace him with the saxophone performer and the social chairman. He received his heavenly harp before we organized the orgy and made it dull and efficient.

THE only open protest I make against organization is when they try to coordinate, clarify, and classify my hours of ease. I am willing to be standardized and monotonized in a church or a skyscraper, but I still insist on being inconsistent and incoherent in my occasional silly moments. One must have *some* relief from regulators.

Spontaneity and freedom of motive were the reasons for what few organizations our ancestors created. They ruled the organization and made it representative because it was a movement built from the grass roots by the sod busters. They didn't have to hunt for reasons and they seldom wrote a tiresome constitution and by-laws just to give some lame duck a pond to swim in.

Now we are beset on all fronts, and from behind as well, by a plaguing surplus of special purpose organizations that have attained the proportions of an epidemic. They are often born illegitimately and prematurely. They operate under beguiling names and purposes. They strike at our credulity and seldom fail to lasso the complacent and uninformed and drag them into the corral to be hog-tied and branded.

If farmers are under-organized, I fail to see it out our way. If manufacturers or merchants or salesmen are unorganized, I hate to think what may happen to their work when the professional zealots finally become satisfied that the zenith of zeal has been attained.

Every day I have a chance to join something. My humble mail-box and my ordinary office is cluttered with circulars of appeal, defiance, and alarm. If such an avalanche comes to a mere onlooker like myself, pray what sort of tidal wave must flood the sanctums of the great and the near great?

Let me glance over this litter of envelopes before they are kicked unopened into the discard. There are societies for the conservation of the constitution; orders of personal liberty; associations pledged to defend state rights and others to promote federal solidarity; societies to irrigate lands and others to drain them; committees to change the calendar and others to correct the coinage; bureaus to better business and to get bigger budgets; and relief foundations for old horses, habitual drinkers, and unread authors.

I marvel at the wonderful store of enthusiasm and nervous energy required by somebody to turn out these vast schemes and get funds enough to buy stamps. It is really a challenge to efficiency engineering to get such men and such minds where the power of their kick-off and recoil might be put to useful purposes.

PRESIDENT HOOVER has promised to tackle the super-power problem some day, but we propose to get him to lay aside such trivial things and coordinate the coordinators, survey the surveyors, standardize the standardizers, and reorganize the organizers. If he does a masterly job of it with enough elimination to it, his success in 1932 is going to be a cinch.

I quote no less an authority than Sears, Roebuck & Company's catalog when I say that production has run far ahead of consumption. If you prefer to stick to Montgomery Ward

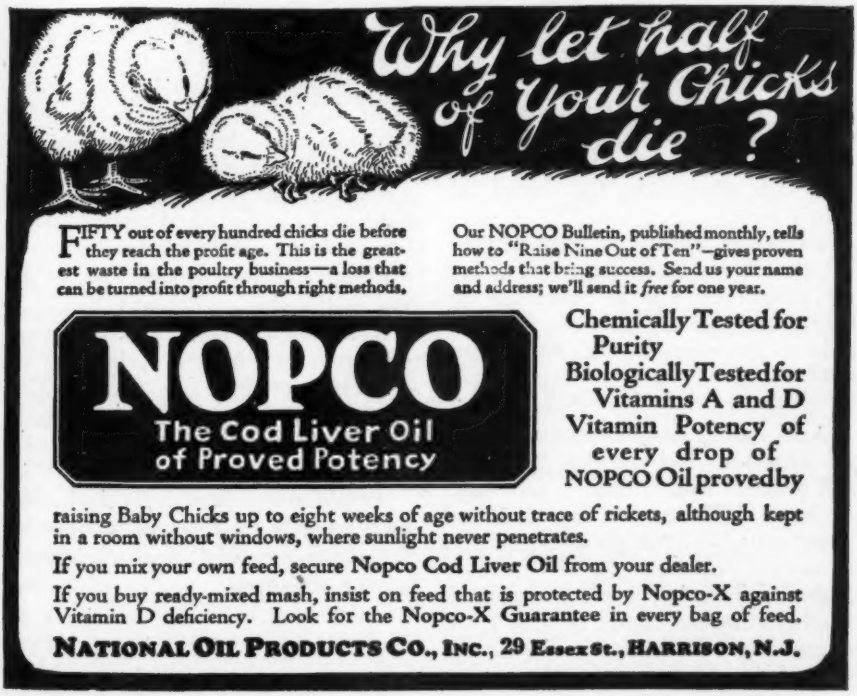
go ahead, it amounts to the same thing. Wise gentlemen in every trade except the bootlegging and undertaking lines are complaining of this unsettling and distributing commercial condition wherein production keeps just about 20 per cent ahead of consumption.

The reason is indeed obvious to trained minds like mine. It is because every known effort and seductive scheme has been bent toward wheedling the last nickel from our pockets through a series of organizations in trade that the world has never witnessed before. Whereas, in consumption channels no organized effort has been put forth to check unwise expenditures or show a beginner how to juggle his dollars so that a few of them fall back into his reserve fund.

Recently I attended a salesmen's convention of a national manufacturing concern. All day long the speakers from the different production and selling departments gestured and gyrated on the platform in their shirt sleeves and taunted the slower salesmen for not getting every red cent of the "vast potential market" which exists out in the moss-grown mortgage belt.

Mechanization of industrial processes have been accompanied by increased capitalizations and the throwing together of giant mergers. No industry seems exempt from the spell of bigness and simplicity combined, the desire to reach out into wider fields and to keep down overhead at the same time. The inefficient folks are suffering, as are the inefficient competitors of such industrial mammoths. This is not an age, however, when sentiment is accepted as logic, and hence the man who wants to be charitable toward the unemployed or the bankrupt finds himself with no means to organize such a crusade.

Well paid employment of American citizens, or at least of the majority of sane citizens, is indeed a very desirable thing. It must be maintained or the purchasing power which


Why let half of your Chicks die ?
FIFTY out of every hundred chicks die before they reach the profit age. This is the greatest waste in the poultry business—a loss that can be turned into profit through right methods.
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those coatless salesmen yelled about will suffer a sudden total eclipse. Where will some of our executive organizers and our office efficiency boys find themselves when there is no longer an expanding rate of consumption on a high standard of living basis?

Some of these bright mornings the leaders of the go-get-'em factions will wake up to the fact that no business is any stronger or sounder than the social structure upon which the nation stands. Some of them have gnawed so close to the core already that they may find the seeds of progress in their teeth before they know it. Will they spit them out or chew upon them thoughtfully? That depends. They may do as Adam did—try to pass the buck to some woman!

All this furore about farm relief is only one sector of the conundrum circle. I know many industrial employes who are having a harder time to pay for their bologna than any hayseed and still have enough left to plunk down a dollar a week on an eight-cylinder gas eater. The only way they can keep the factory wheels turning in some other plant so that brother workers may keep busy is to organize a household budget. When that fails they sneak down in their shirt tails some night and empty the baby's bank.

Sometimes when I see how successful all this super-power organization for production and salesmanship has been with industry—in one direction only—I am happy enough to hug my mother-in-law because farm folks have been so blamed slow about it.

And yet the bucolic clan has made its blunders likewise by following bell-wethers who tinkled a false note of hope. "Do as business does and chart your courses" has been the plea of sweaty orators at farmers' picnics. I never followed their argument much further than the climax because I had urgent business over near the sinkers and salads. However, I gathered that something was wrong somehow somewhere, so I pulled a baby or two out of the ice cream cans and felt content. As I am longer on social obligations than statistics, I need offer no excuse for my actions.

Revolutions and resolutions are inseparable from any bona fide organization. They have to show that the one exists before they can move to have the other adopted. But did it ever strike you that some of the world's best revolutions and resolutions have been brought about by individuals acting alone, and later inoculating somebody else with the same germ. It costs far less, too, which to men of my name and nature is a weighty argument.

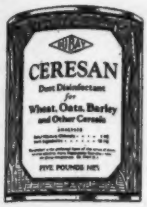
NEITHER science nor philosophy has provided for substitutes for common sense. That is, or should be, as much your individual possession as mine, although I am willing to admit that you *have* had serious handicaps. If you have it, organize it!

Guard that iota of common sense like your coal bin, or whatever else that is precious down in your cellar. Hold fast to it and exercise it fully at home and abroad when you are asked to endorse something that resembles a cross between a Russian tea-fight and a multilateral treaty! Your brain was provided to keep you *out* of organizations just as much as to get you into them.

Yet when the time comes to accept your part in some enterprise that has social justice and fair play sticking out all over it with no jokers in the preamble, grab your share of the wheel and push.

People who adopt individual common sense as their first birthright are not apt to get their fingers sticky with a mess of pottage.

And whatever you do, don't let them elect you on the board. There are apt to be slivers in it!

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IN discussing the advantages of a dust treatment for the control of oats and barley stripe, Dr. Benjamin Koehler, writing in the mimeographed leaflet, "New Seed Treatment for Oats and Barley," just published by the Illinois Agricultural Experiment Station, ascribes the failure of the old formaldehyde treatment in giving good results to the following:

"(a) failure to mix the formaldehyde solution thoroughly with the oats; (b) mixing the formaldehyde solution in wrong proportions and thereby killing the seed; (c) if rainy weather sets in soon after making the treatment, the oats can neither be sown nor dried properly, and considerable injury to germination is likely to occur. Dust treatments are more foolproof and convenient because (1) they come prepared ready for use, (2) no subsequent drying of the grain is necessary, (3) treatment can be made at any time prior to seeding regardless of freezing temperature, and (4) as dust treatments already are becoming standard for the treatment of corn and wheat, the process is simplified by using the same method and apparatus for the treatment of all these crops.

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| No Treatment | 64.3 | 67.6 |
| Wet formaldehyde | 70.0 | 79.0 |
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* Average of 10 replications.

Ceresan is effective in controlling such diseases as bunt or stinking smut of wheat, flag smut of wheat (seed-borne), stripe disease of barley, loose smut of barley in certain six-rowed winter varieties, covered smut of barley, loose smut of oats, covered smuts of oats, kernel smuts of sorghum and seed-borne stem smut of rye.

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## YOU CAN'T PLEASE 'EM

A chorus girl, deliciously pretty, but decidedly lowbrow, somehow found herself at a very select party given by a famous society woman.

The girl, lonely and uncomfortable as a fish out of water, because of her utter ignorance, was leaning against the wall, framed against the dark oak, when the hostess took pity on her.

"My dear," she said, kindly, "you look just like an old Rembrandt."

"Well," retorted the stupid beauty, sharply, "you don't look too darned snappy yourself."—*The Pitchfork.*

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A Scotchman, not feeling so well as usual, called on his family doctor, who looked him over and gave him some pills to be taken at bedtime. Whiskey was also prescribed for his stomach's sake, a small glass to be taken after each meal.

Four days later Sandy again called on the doctor, stating he was feeling no better.

"Have you taken the medicine exactly as I instructed?" the doctor inquired.

"Weel, doctor," replied the patient, "I may be a wee bit behindt wi' the pills, but I'm six weeks ahead wi' the whusky."—*Wroe's Writings.*

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Daughter: "Mother, do you want me to put the parrot on the back porch?"

Mother: "Positively no! Your father is repairing the car in the back yard."—*Ex.*

## BRIDEGROOM SLIPPED

A colored woman was telling a friend of a wedding she attended. She told of the bride's white satin gown, slippers, veil, flowers, and everything she could think of. "What did the bridegroom wear?" asked the friend.

"Well, you know that good-for-nothing nigger man never showed up at all," she said.

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Minister: "I hear, Paddie, they've gone dry in the village where your brother lives."

Paddie: "Dry, mon! They're parched. I've just had a letter from Mike, an' the postage stamp was stuck on with a pin."—*Schaefer Magazine.*

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Modern Girl: "I understand that the girls of your time 'set their caps' for men, Grandma."

Grandma: "Yes, child, but not their knee-caps."—*The Pathfinder.*

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"Young Rose 'Awkins is goin' abaht sayin' you're in love with 'er, 'Arry. Is that right?"

"Garn! Don't tike no notice of 'er! I may 'ave give 'er a clip or two over the ear, but that's all thert is in it."

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Boss: "There's two dollars missing from my desk drawer and no one but you and I have a key to it."

Office Boy: "Well, let's each put a dollar back and say no more about it. —*The Enamelist.*

**"To Create Standard Forms of Investment Based Upon Farm Mortgage"**

*(From the Introduction to the Farm Loan Act)*

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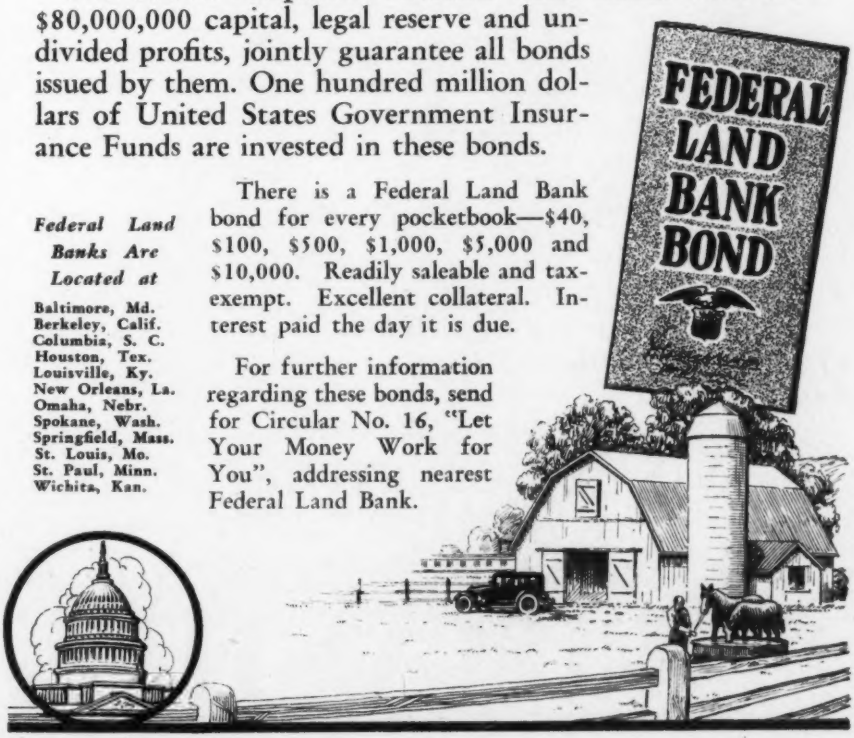

# *They tripled their*

# POTASH

## at 450% profit

**FERTILIZER demonstrations on their own farms during the last three years proved to more than 250 cotton farmers in 11 states that they can profitably apply an average of 3½ times as much potash as they had applied in the past. They found that each $1 invested in extra potash paid them an average return of $5.50 in extra seed cotton—a profit of 450%.**

**If you want your cotton to pay you extra cash, make sure that it gets plenty of potash. See that your cotton fertilizer contains ample potash, as indicated by the last figure in the analysis. Also give your cotton extra potash at chopping as a top-dressing. Extra potash pays extra cash!**

***Write us for free information about the many farmers who have gotten extra cash for cotton***

**Agricultural and Scientific Bureau**

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